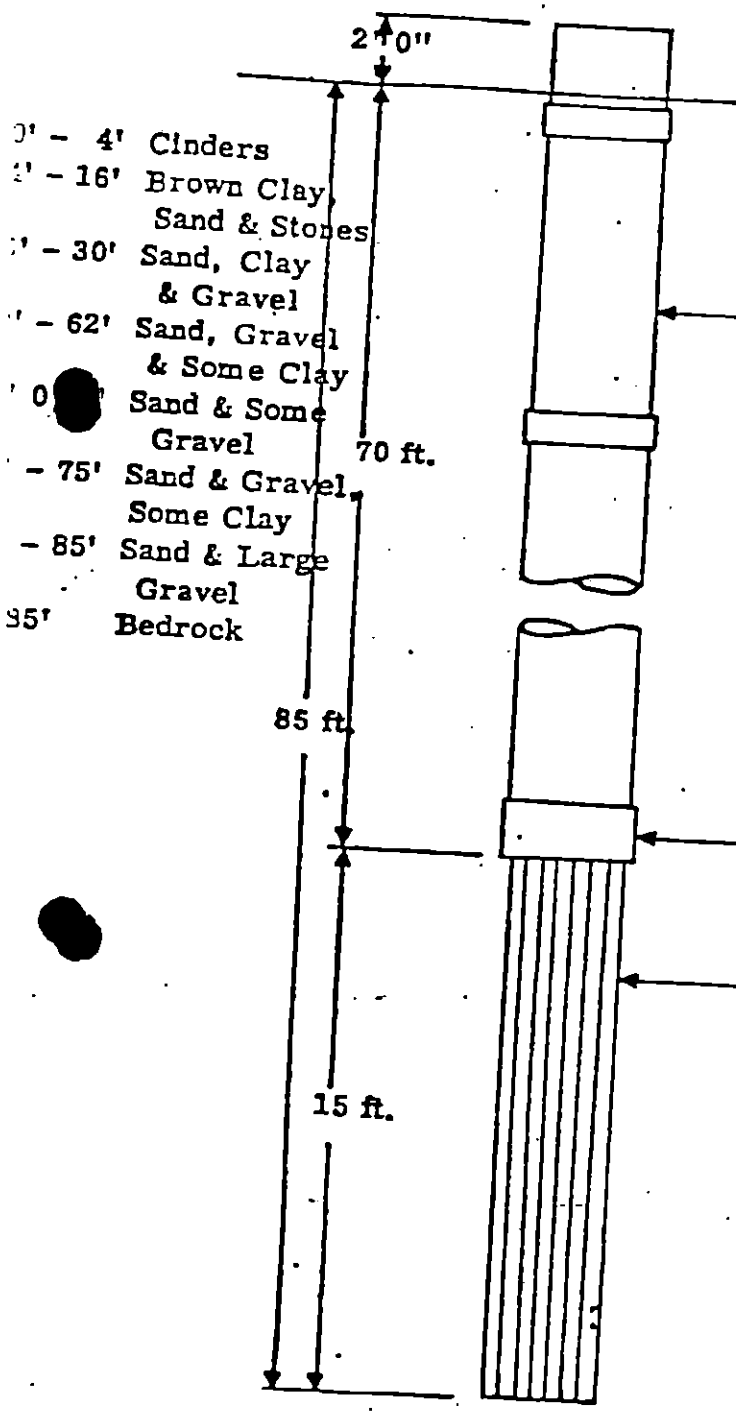
# APPENDIX A

# MONITORING WELL LOGS

No. 53 - 16" Water Well (GM-0)
(Located midway between water wells 55 & 28, at north end of plant)




NOTE: Peerless pump installed on steel base plate welded to casing. Pump has 60 ft. of 6" x 1-3/16" column, 5-stage 10" bc 5 ft. of suction.

CASING 16" std., steel, 3/8" wall, bande and welded joints.

DEVELOPMENT Swabbed with drilling rig and surg block, dosed with 400 lbs. sodium hexameta phosphate and backwashed to waste with temporary test pump. Ten ft. of sand swabb in and removed.

CAPACITY Pumping level 56.33 ft. at 600 gpm. Static level 44.08 ft. Specific capacity 49 gpm per ft. of drawdown. Well loss coefficienc 0.16.

SCREEN Drilling Co. Type H, Keystor Bar, stainless steel, 80 slot.

DRILLED BY:

COMPLETED: October 7, 1981

Elevation - top of outer casing:693.10 ft, msl

| Lithologic Description | Depth (ft) | | | Thickness (ft) |
|---|---|---|---|---|
| Sandy loam, red brown | 0 | - | 2 | 2 |
| Clay, cinders, coal, sandstone fragments, red brown, moist | 2 | - | 13 | 11 |
| Gravel, poorly sorted, clayey, red brown, very moist | 13 | - | 18 | 5 |
| Clay, gravelly, coal fragments, red brown | 18 | - | 23 | 5 |
| Sand, medium to coarse grained, well sorted, red brown, coal fragments | 23 | - | 43 | 20 |
| Clay, stiff, red brown to yellow brown, weathered green to gray sandstone fragments | 43 | - | 68 | 25 |
| Silt, clayey, gray to yellow brown, iron stains | 68 | - | 73 | 5 |
| Clay, massive, plastic, gray | 73 | - | 83 | 10 |
| Silt, sandy, gray green to brown, sandstone fragments | 83 | - | 93 | 10 |
| Sand, silty, fine-grained, subrounded yellow brown, brownish-green gravel | 93 | - | 96 | 3 |

GM-2

Elevation - top of outer casing: 709.88 ft, msl

| Lithologic Description | Depth (ft) | Thickness (ft) |
|---|---|---|
| Silt, loam, brown, gravel | 0 - 3 | 3 |
| Clay, silty, brown to yellow brown, sandstone fragments, moist | 3 - 33 | 30 |
| Sand, medium grained, white to orange brown, rock fragments | 33 - 43 | 10 |
| Silt, clayey, tan to gray, wet | 43 - 48 | 5 |
| Clay, plastic, silty, red brown, weathered sandstone and coal fragments | 48 - 93 | 45 |
| Clay, gray to brown, coal and sandstone fragments, sand and silt lenses, moist | 93 - 100 | 7 |
| Mudstone, weathered, friable, gray, dry | 100 - 106 | 6 |

GM-3

Elevation - top of outer casing: 721.99 ft, msl

| Lithologic Description | Depth (ft) | Thickness (ft) |
|---|---|---|
| Clay loam, rock fragments, brown, micaceous, moist | 0 - 3 | 3 |
| Clay, plastic, stiff, rock fragments, brown, moist | 3 - 23 | 20 |
| Silt, clayey, gray-green, mottled, wet | 23 - 33 | 10 |
| Clay, stiff, red brown, sandstone fragments | 33 - 50 | 17 |
| Sandstone, friable, yellow brown to gray green, micaceous | 50 - 55 | 5 |

GM-4

Elevation - land surface: 715 ft, msl

| Lithologic Description | Depth (ft) | Thickness (ft) |
|---|---|---|
| Cinders | 0 - 5 | 5 |
| Sand, silty, medium grained, tan to brown, micaceous, plastic clay lenses | 5 - 6.5 | 1.5 |
| Clay, stiff, red brown, yellow mottling, sandstone and coal fragments, moist | 6.5 - 29 | 22.5 |
| Sand, silty, brown to orange, lenses of plastic clay, sandstone fragments | 29 - 33.5 | 4.5 |
| Silt, sandy, brown, rock fragments, moist | 33.5 - 38 | 4.5 |
| Sand, fine to coarse grained, poorly sorted, brown to tan, wet | 38 - 41.5 | 3.5 |
| Silt, clayey, gray, sandstone fragments, moist | 41.5 - 48 | 6.5 |
| Clay, silty, green to gray, sandstone fragments, micaceous | 48 - 79 | 29 |
| Mudstone, friable, gray to brown, dry | 79 - 81 | 2 |

GM-5

Elevation - top of outer casing: 718.39 ft, msl

| Lithologic Description | Depth (ft) | Thickness (ft) |
|---|---|---|
| Same as GM-4 | 0 - 50 | |

GM-6

Elevation - top of outer casing: 696.90 ft, msl

| Lithologic Description | Depth (ft) | Thickness (ft) |
|---|---|---|
| Clay loam, orange brown, gravel, moist | 0 - 3 | 3 |
| Clay, dense, brown, gravelly | 3 - 18 | 15 |
| Sand, silty, medium to coarse grained, poorly sorted, brown, moist, sandstone fragments | 18 - 41 | 23 |
| Clay, dense, red brown, sandstone fragments | 41 - 60 | 19 |
| Silt, clayey, green, wet | 61 - 64 | 3 |
| Clay, stiff, red brown, sandstone fragments | 64 - 75 | 11 |
| Siltstone, friable, gray, micaceous, shaley | 75 - 80 | 5 |

GM-7

Elevation - top of outer casing: 710.74 ft. msl

| Lithologic Description | Depth (ft) | Thickness (ft) |
|---|---|---|
| Same as GM-2 | 0 - 29.5 | 29.5 |
| Sand, silty, fine grained, orange brown to tan, rock fragments | 29.5 - 43 | 13.5 |
| Clay, plastic, red brown, sandstone fragments, moist | 43 - 56 | 13 |

# APPENDIX B

# SAMPLING AND ANALYSIS PLAN

CONTENTS

## TABLES



## FIGURES

## 1.0 Introduction

Section 265.92 of the U. S. Environmental Protection Agency Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (FR 45:98, 33239), requires hazardous-waste facilities to undertake a ground-water monitoring program at all facilities being operated under "Interim Status". The requirement includes the installation of monitor wells, sampling of these wells, analysis of the water samples for selected water-quality parameters, and evaluation of the collected data.

To comply with these requirements, a monitoring network has been defined based upon data contained in the report, "Evaluation of Ground-Water Quality Impacts at Mercury Pond. Additionally, this "Sampling and Analysis Plan" has been prepared to delineate sampling frequency and methods, and chemical parameters and analytical methods. A companion document, the "Ground-Water Quality Assessment Plan Outline" has been prepared to delineate data evaluation procedures, reporting requirements, and development of a detailed Ground-Water Quality Assessment Plan, if needed.

## 2.0 Sample Collection, Preservation, and Shipment

### 2.1 Frequency of Sample Collection

Table 2.1 presents 44 ground-water quality parameters which must be monitored at the mercury pond site on a quarterly basis during the first year of monitoring. The table includes all parameters required by EPA in Section 265.92 in addition to ground-water quality parameters suggested by the consultant. A map of the mercury pond site showing monitor well locations is presented in Figure 1. Monitor wells GM-1, GM-2, GM-6, and the Site water-supply well will be sampled to determine the quality of ground water in the regional River alluvial aquifer.

### 2.2 Equipment

Sampling equipment needed for collecting representative samples of ground water are presented below.

1) 100-ft fiberglass or plastic measuring tape with weighted bottom (or) water level indicator ("m-scope") consisting of an ammeter, electrode and 100-ft cable;

2) Several gallons of distilled water and wash bottle;
3) Clean rags;
4) Plastic sheeting or large size garbage bags;
5) Bottom filling PVC bailer and 120-ft nautical rope (or) Middleburg pump;
6) Graduated bucket;
7) 7 sample bottles per sampling point;
8) Sample bottle labels, water-proof marking pen;
9) pH meter;
10) Thermometer;
11) Specific conductivity meter;
12) Preservatives for water samples;
13) Field data forms, clipboard, pen; and
14) Optional: ice chest and ice or freezer packs.

## 2.3 Sample Collection Method

### 2.3.1 Procedures for Measuring Water Levels

a) Place plastic sheeting around well to protect sampling equipment from potential contamination.

b) After unscrewing outer casing cap, measure the depth to water in the well. All measurements are made from top of metal casing.

- Using the M-scope, drop the probe down the center of the casing and allow cord to go untangled down the well. When ammeter indicates a closed electrical circuit, determine depth to water from top of outer metal casing. Record depth to water on field data form (Figure 2). Subtract this value from elevation at top of outer casing to find elevation of water level (see Figure 3 for elevation of top of casing).

(or)

- Using a fiberglass or plastic 100-ft tape with sandpaper backing on first five feet, drop weighted tape down center of casing. After water is encountered in well, record measurement of tape at top of casing, wind up tape and record the measurement where tape is wet. Subtract the "wet" measurement from the "held" measurement to determine the depth to water. Subtract this value from the elevation at top of outer casing to find elevation of water level.

- The water level measurements must be obtained at each sampling point every time water samples are collected. This information must be recorded and sent to the EPA Regional Administrator with the annual report (refer to the Assessment Plan for further information on reporting requirements).

c) Clean M-scope or tape bottom with distilled water and wipe dry with clean rag.

2.3.2 Procedures for Removing Standing Water in Wells

a) Remove at least one well volume of standing water using either the Middleburg pump or a hand bailer.

- To find the volume of standing water in the well, use the following calculation:

$$V = \pi r^2 h$$

where V = volume ($ft^3$)

$\pi$ = 3.14

r = radius of monitor well casing (ft)

h = height or standing water in well (ft)

- The height of standing water in the well is found by subtracting the depth to water measurement from the total depth of the well (refer to Figure 3 for depth of monitor wells)

- It is generally recommended to remove three to five well volumes of water from the well to insure an accurate sample of ground-water quality but this may not be possible with the low yielding wells surrounding the mercury pond. At the least, the well should be pumped or bailed to dryness before sampling. Use graduated bucket to measure volume of work removed from the well.

. The "Procedures Manual for Ground Water Monitoring at Solid Waste Disposal Facilities", pp 220 to 270, should be consulted for further information concerning the amount of water to evacuate from the well, types of pumps or bailers to use in sampling ground water, and procedures to follow for using pumps or bailers. Another reference source is the U. S. Geological Survey (USGS) publication, "Guidelines for Collection and Field Analysis of Ground-Water Samples for Selected Unstable Constituents" pp 3 to 9.

b) Test each bailed portion of water or portions of pumped water for pH, temperature and specific conductance. Record values and discard sample.

c) Clean bailer or pump with distilled water before use in other wells to prevent possible cross contamination of ground water in the monitor wells. If the organic parameters are a major focus of concern, one should use teflon bailers and wash with acetone or hexane after sample collection.

2.3.3 Procedures for Sample Collection and Field Analyses

a) Allow well to recharge sufficiently to obtain samples. In some wells, this may require waiting a few minutes to a few hours; in other wells recovery time may be extremely slow and sampling may not be possible until after 24 hours. If the well is incapable of producing sufficient water required for analyses, composite sampling may be necessary where small quantities of samples are taken several days in a row.

b) Analyses of pH, temperature, and specific conductance should be made in the field at the time of sampling because these parameters change rapidly and a laboratory analysis might not be representative of the true ground-water quality. Remove enough water from well to determine

temperature of water, specific conductivity, and pH. Record values on field data sheet and discard water.

c) Rinse sample bottle with sampled ground water except coliform bacteria sample and the organic halogen/pesticides sample bottle (refer to Table 2.3.3).

d) Transfer water from well sampling device to sample bottles provided by the laboratory. Care should be taken not to agitate sample in order to limit amount of added oxygen to water sample. Minimize the number of containers used in order to limit the addition of outside contaminants. Sample bottles should be prepared as specified by future EPA regulations, the 1974 EPA "Manual of Methods for Chemical Analysis of Water and Wastes" (EPA 625/6-74-0030, or as specified within this plan.

e) Table 2.3.3 lists seven bottles which must be collected quarterly at each well during the first monitor year. These sample volumes may be increased as necessary based on laboratory needs and future EPA guidelines. The volumes listed below are based upon several EPA publications (EPA 625-16-74-003, EPA 600/4-76-049, and EPA/530/SW-611), and on the consultant's best judgement which is based upon publications and verbal communications with EPA support laboratories.

f) If there is insufficient water in the well to supply the necessary volumes for samples specified above, the sample collector should fill up as many bottles as possible, preserve and label as required, and continue sampling daily until the remaining bottles are filled. Table 2.3.4 provides data on maximum sample holding time for the ground-water quality parameters.

2.3.4 Procedures for Sample Preservation and Shipment

Many chemical parameters are unstable in water and may change drastically before analysis if the sample is not "fixed" or

preserved at the time of sampling. Table 2.3.4 presents information on methods of preservation and this table should be used in conjunction with the information on Table 2.3.3. The procedures for sample preservation and shipment are outlined below.

a) Add appropriate preservatives to sample bottles as listed on Table 2.3.4.

b) Seal sample bottle caps and label bottle. Labels should show sample number, date, sample source, preservative added, if any, and analysis to be performed. Refer to sample bottle tags in Figure 4.

c) Enter all pertinent information on field data sheets and chain of custody form.

d) Transfer samples to ice chest for shipment to laboratory.

e) Clean all equipment with distilled water and wipe with clean rags. Proceed to next sampling point.

f) Shipment of samples to laboratories to perform analyses outside PPG's capabilities should be performed with as few transfers as possible. All samples must remain cooled at 4°C during shipment. Additional information concerning sampling can be found in EPA 600/4-76-049, "Handbook for Sampling and Sample Preservation of Water and Waste Water".

## 3.0 Laboratory Analysis of Samples

During the first monitor year, PPG must sample ground water at the mercury pond site on a quarterly basis and perform laboratory analyses for the 44 parameters listed in Table 3.0. This table provides the currently accepted analytical procedures for each water quality parameter. The appropriate reference sources are listed on the table for detailed information related to the laboratory procedures. Appendix I and II provide methods of analysis for total organic halide and total organic carbon.

If no ground-water contamination is found during the first monitor year, PPG must collect ground-water samples during the second and subsequent years on an annual and semi-annual basis. Table 2.1 presents the list of ground-water quality parameters and the frequency of sample collection. Additional information is contained in the monitoring plan. The EPA Environmental Monitoring and Support Laboratory or EPA Region should be contacted concerning specific questions on analytical procedures, quality control, and frequency of sampling should the references mentioned above not provide adequate information to laboratory personnel.

## 4.0 Chain of Custody

The facility must demonstrate the reliability of data by proving the chain of possession and custody of any ground-water samples collected at the mercury pond site. There are two steps in the chain of custody procedure; 1) the transfer of bulk samples to outside laboratories. In general, a sample is in custody if it is in someone's actual physical possession, in view after being in physical possession, or in physical possession and locked up. Figure 5 presents a sample chain of custody record form to be used when transferring bulk samples to a laboratory. PPG personnel should consult EPA-600/4-76-049 "Handbook for Sampling and Sample Preservation of Water andd Wastewater" or the EPA Region personnel for specific questions concerning chain of custody requirements. At the time of report preparation, no specific steps or procedures have been required by EPA for chain of custody control. A general practice of minimal transfers of sample bottles and good record keeping should provide adequate chain of custody control.

## Bibliography

Johnson, Thomas M., and Keras Cartwright, 1980, Monitoring of Leachate Migration in the Unsaturated Zone in the Vicinity of Sanitary Landfills, Illinois State Geological Survey Circular 514, 82 p.

Moser, J.H., and K.R. Huibregtse, 1976, Handbook for Sampling and Sample Preservation of Water and Wastewater, EPA-600/4-76-049, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, 257 p.

Taras, Michael J., Arnold E. Greenberg, R.D. Hoak, and M.C. Rand, 1971, Standard Methods for the Examination of Water and Wastewater, American Public Health Association, Washington, D.C., 874 p.

Todd, David K., et al, 1976, Monitoring Groundwater Quality: Monitoring Methodology, EPA 600/4-76-026, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Las Vegas, Nevada, 172 p.

U.S. Environmental Protection Agency, 1979, Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Environmental Monitoring and Support Laboratory, Office of Research and Development, Cincinnati, Ohio, 460 p.

U.S. Environmental Protection Agency, 1980, Federal Register, Volume 45, No. 98., Monday, May 19, 1980, 33154 Part VII, Subpart F, 265.90-265.94, "Ground-Water Monitoring".

Wood, Warren W., 1976, Guidelines for Collection and Field Analysis of Ground-Water Samples for Selected Unstable Constituents, U.S. Department of the Interior, U.S. Geological Survey, 24 p.

TABLE 2.1: GROUND-WATER QUALITY PARAMETERS

| Ground-Water Quality Parameter | Ground-Water Sampling Frequency | |
|---|---|---|
| | First Monitor Year | Second Monitor Year |
| **Ground-Water Contamination Indicators** | | |
| pH | Quarterly | at least Semi-Annually |
| Specific Conductance | Quarterly | Semi-Annually |
| Total Organic Carbon | Quarterly | Semi-Annually |
| Total Organic Halogen | Quarterly | Semi-Annually |
| | (4 replicate measurements must be obtained for each sample from PPG water-supply well) | |
| **Ground-Water Quality Parameters** | | |
| Chloride | Quarterly | at least Annually |
| Iron[1] | Quarterly | Annually |
| Manganese | Quarterly | Annually |
| Phenols | Quarterly | Annually |
| Sodium | Quarterly | Annually |
| Sulfate | Quarterly | Annually |
| **Drinking Water Supply Parameters** | | |
| Arsenic | Quarterly | - |
| Barium | Quarterly | - |
| Cadmium | Quarterly | - |
| Chromium (VI[2] and total) | Quarterly | - |
| Fluoride | Quarterly | - |
| Lead | Quarterly | Semi-Annually[2] |
| Mercury (dissolved[2] and total) | Quarterly | - |
| Nitrate (N) | Quarterly | - |
| Selenium | Quarterly | - |
| Silver | Quarterly | - |
| Endrin | Quarterly | - |
| Lindane | Quarterly | - |
| Methoxychlor | Quarterly | - |
| Toxaphene | Quarterly | - |

| Ground- Water Quality Parameter | First Monitor Year | Second Monitor Year |
|---|---|---|
| 2,4 -D | Quarterly | - |
| 2,4,5 -TP Silvex | Quarterly | - |
| Radium | Quarterly | - |
| Gross Alpha | Quarterly | - |
| Gross Beta | Quarterly | - |
| Turbidity | Quarterly | - |
| Coliform Bacteria | Quarterly | - |
| **Additional Parameters[2]** | | |
| Alkalinity (as $HCO_3$ and $CaCO_3$) | Quarterly | - |
| Calcium | Quarterly | - |
| Color | Quarterly | - |
| Copper | Quarterly | - |
| Magnesium | Quarterly | - |
| pH, field | Quarterly | Semi-Annually[2] |
| Specific Conductance, field | Quarterly | Semi-Annually[2] |
| Potassium | Quarterly | - |
| Total Dissolved Solids | Quarterly | Semi-Annually[2] |
| Zinc | Quarterly | - |

[1]All metals are Total metals (not dissolved) unless otherwise specified.
[2]Additional parameters recommended by consultant, not required by EPA.

TABLE 2.3.3: LIST OF SAMPLE BOTTLE SIZE AND SAMPLE PRESERVATION

(1) Use a 500 ml clean plastic or glass sample bottle for the following parameters:

pH (laboratory)[1]
specific conductance (laboratory)[1]
chloride[2]
iron[2]
sulfate[2]
fluoride[3]
turbidity[3]
alkalinity (as $HCO_3$ and $CaCO_3$)[4]
calcium[4]
color[4]
mercury, dissolved[4]
potassium[4]
total dissolved solids[4]

Cool bottle at $4^0$C.

(2) Use a 500 ml clean glass sample bottle washed with nitric acid for the following parameters:

manganese[2]
sodium[2]
arsenic[3]
barium[3]
cadmium[3]
chromium, hexavalent[4] and total[3]
lead[3]
mercury, total[3]
selenium[3]
silver[3]
copper[4]
magnesium[4]
zinc[4]

Acidify samples with $HNO_3$ to pH <2; cool at $4^0$C. All metals are total metals unless otherwise specified.

(3) Use a 500 ml clean glass sample bottle for the following parameters:

total organic carbon[1]
nitrate (as N)[3]

Acidify sample with $H_2SO_4$ to pH <2; cool at $4^0$C.

(4) Use a 500 ml clean glass sample bottle for:

phenols[2]

Acidify with $H_3PO_4$ to pH <4; cool at 4°C.

(5) Use a 500 ml clean, glass sample bottle, solvent washed, with teflon-lined caps for the following parameters:

total organic halogen[1]
endrin[3]
lindane[3]
methoxychlor[3]
toxaphene[3]
2,4-D[3]
2,4,5-TP Silvex[3]

DO NOT RINSE SAMPLE BOTTLE WITH WATER SAMPLE BEFORE SAMPLING.
Cool bottles at 4°C.

(6) Use a 100 ml sterile glass sample bottle and sterile cap for:

coliform bacteria

Cool at 4°C.

(7) Use a 100 ml clean glass sample bottle cleaned with nitric acid and rinsed with double distilled water for the following parameters:

radium[3]
gross alpha[3]
gross beta[3]

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[1]Ground-Water Contamination Indicators

[2]Ground-Water Quality Parameters

[3]Drinking Water Supply Parameters

[4]Additional Parameters Recommended by Consultant for First Year of Monitoring

| WATER QUALITY PARAMETER | CONTAINER | METHOD OF PRESERVATION[1] | HOLDING TIME |
|---|---|---|---|
| Additional Parameter[2] (Cont) | | | |
| Potassium, total | P | Cool 4°C | 6 mos |
| Total Dissolved Solids (TDS) | P, G | Cool 4°C | 7 days |
| Zinc, total | G | $HNO_3$ to pH<2 | 6 mos |

[1] Primary data sources: p. viii, EPA-625/6-74-003 "Methods for Chemical Analysis of Water and Wastes" and Chapter 10, EPA-600/4-76-049, "Handbook for Sampling and Sample Preservation of Water and Wastewater."

[2] Additional parameters recommended by consultant, not required by EPA.

[3] Also refer to "Methods for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents" MDQARL, EPA, Cincinnati, Ohio, November 28, 1973 and "Method for Organochloride Pesticides in Industrial Effluents" MDQARL, EPA, Cincinnati, Ohio, November 28, 1973.

[4] P = Polyethylene bottles
G = Glass bottles

[5] Do NOT rinse container with ground water before sample collection.

[6] Refer to EPA guidelines and regulations for more information.

TABLE 3.0: ANALYTICAL PROCEDURES

| WATER QUALITY PARAMETERS | ANALYTICAL PROCEDURES[1] | REFERENCES (page number) | | |
|---|---|---|---|---|
| | | 1974 EPA METHODS | 14th EDITION STANDARD METHODS | 1975 Part 31 ASTM |
| **Ground-Water Contamination Indicators** | | | | |
| pH | Electrometric measurement Field analysis preferred | 239 | 460 | 178 |
| Specific Conductance | Wheatston bridge conductimetry | 275 | 71 | 120 |
| Total Organic Carbon | Combustion - infrared method | 236 | 532 | 467 |
| Total Organic Halogen | Microcoulometric-titration detection method. Refer to Method 450.1 included in the appendix | - | - | - |
| **Ground-Water Quality Parameters** | | | | |
| Chloride | Silver nitrate; mercuric nitrate; or automated colorimetric-ferricyanide | 29; 31 | 303; 304; 613 | 267; 625 |
| Iron, total | Digestion followed by atomic absorption; or colorimetric (Phenanthroline) | 110 | 148; 208 | 345; 328 |
| Manganese, total | Digestion followed by atomic absorption; or colorimetric (Persulfate or periodate) | 116 | 148; 225; 227 | 345 |
| Phenols | Colorimetric (4AAP) | 241 | 582 | 545 |
| Sodium, total | Digestion followed by atomic absorption; or flame photometric | 147 | 250 | 403 |
| Sulfate | Gravimetric; turbidimetric; or automated colorimetric (barium chloranilate) | 277; 279 | 493; 496 | 424; 425 |

| WATER QUALITY PARAMETERS | ANALYTICAL PROCEDURES[1] | REFERENCES (page number) | | |
|---|---|---|---|---|
| | | 1974 EPA METHODS | 14th EDITION STANDARD METHODS | 1975 Part 31 ASTM |
| Drinking Water Supply Parameters | | | | |
| Arsenic, total | Digestion followed by silver diethyldithiocarbamate; or atomic absorption | 9; 95 | 285; 283; 159 | - |
| Barium, total | Digestion followed by atomic absorption | 97; 98 | 152 | - |
| Cadmium, total | Digestion followed by atomic absorption; or colorimetric (Dithizone) | 101 | 148; 182 | 345 |
| Chromium, hexavalent[2] | Extraction and atomic absorption; colorimetric (Diphenylcarbazide) | 89; 105 | 192 | - |
| Chromium, total | Digestion followed by atomic absorption; or colorimetric (Diphenylcarbazide) | 105 | 148; 192 | 345; 286 |
| Fluoride, total | Distillation followed by ion electrode; SPADNS; or automated complexone | 65; 59; 61 | 389; 391; 393 614 | 307; 305 |
| Lead, total | Digestion followed by atomic absorption; or colorimetric (Dithizone) | 112 | 148; 215 | 345 |
| Mercury, dissolved[2] | Filter with 0.45 micron paper followed by the referenced method for total maganese | | | |
| Mercury, total | Flameless atomic absorption | 118 | 156 | 338 |
| Nitrate (N) | Cadmium reduction; brucine sulfate; automated cadmium or hydrazine reduction | 201; 197; 207 | 423; 427; 620 620 | 358 |
| Selenium, total | Digestion followed by atomic absorption; | 145 | 159 | - |
| Silver, total | Digestion followed by atomic absorption; or colorimetric (Dithizone) | 146 | 148; 243 | - |

| WATER QUALITY PARAMETERS | ANALYTICAL PROCEDURES[1] | REFERENCES (page number) | | |
|---|---|---|---|---|
| | | 1974 EPA METHODS | 14th EDITION STANDARD METHODS | 1975 Part 31 ASTM |
| Drinking Water Supply Parameters | | | | |
| Endrin[3] | EPA Method 625; Gas chromotography | December 3, 1979 Federal Register | 555 | - |
| Lindane[3] | EPA Method 625; Gas chromotography | December 3, 1979 Federal Register | 555 | - |
| Methoxychlor[3] | Gas Chromotograph | - | 555 | - |
| Toxaphene[3] | EPA Method 625; Gas chromotography | December 3, 1979 Federal Register | 555 | - |
| 2,4-D[3] | Gas Chromotography | - | 555 | - |
| 2,4,5-TP Silvex[3] | Gas Chromotography | - | 555 | - |
| Radium | Proportional counter; scintillation counter | - | 661 | 661 |
| Gross Alpha | Proportinal counter; scintillation counter | - | 648 | 591 |
| Gross Beta | Proportional counter | - | 648 | 601 |
| Turbidity | Nephelometric method | 295 | 132 | 223 |
| Coliform Bacteria, total | Most Probable Number (MPN); membrane filter | 916; 928 | - | 35 |

| WATER QUALITY PARAMETERS | ANALYTICAL PROCEDURES[1] | REFERENCES (page number) | | |
|---|---|---|---|---|
| | | 1974 EPA METHODS | 14th EDITION STANDARD METHODS | 1975 Part 31 ASTM |
| Additional Parameters[2] | | | | |
| Alkalinity (as $CaCO_3$ and $HCO_3$) | Electrometric titration (only to pH 4.5) manual or automated, or equivalent automated methods | 3; 5 | 278 | 111 |
| Calcium, total | Digestion followed by atomic absorption; or EDTA titration | 103 | 148; 189 | 345 |
| Color | Colorimetric; Spectrophotometric; or ADMI procedure | 36; 39 | 64; 69 | - |
| Copper, total | Digestion followed by atomic absorption; or colorimetric (Neocuproine) | 108 | 148; 196 | 345; 293 |
| Magnesium, total | Digestion followed by atomic absorption; orgravimetric | 114 | 148; 221 | 345 |
| pH, field | Portable pH meter. Refer to operating instructions with meter | 239 | 460 | 178 |
| Specific conductance (field) | Portable conductivity meter. Refer to operating instructions with meter | 275 | 71 | 120 |
| Potassium, total | Digestion followed by atomic absorption; colorimetric (Cobaltinitrite); or flame photometric | 143 | 235; 234 | 403 |
| Total Dissolved Solids (TDS) | Glass fiber filtration, 180°C | 266 | 92 | - |
| Zinc, total | Digestion followed by atomic absorption; or colorimetric (Dithizone) | 155 | 148; 265 | 345 |

1 Primary data source: EPA, Table 1 "List of Approved Test Procedures", draft copy from 1979 EPA methods manual.

2 Additional parameters recommended by consultant, not required by EPA.

3 Also refer to "Methods for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents" MDQARL, EPA, Cincinnati, Ohio, November 28, 1973 and "Method for Organochloride Pesticides in Industrial Effluents" MDQARL, EPA, Cincinnati, Ohio, November 28, 1973.

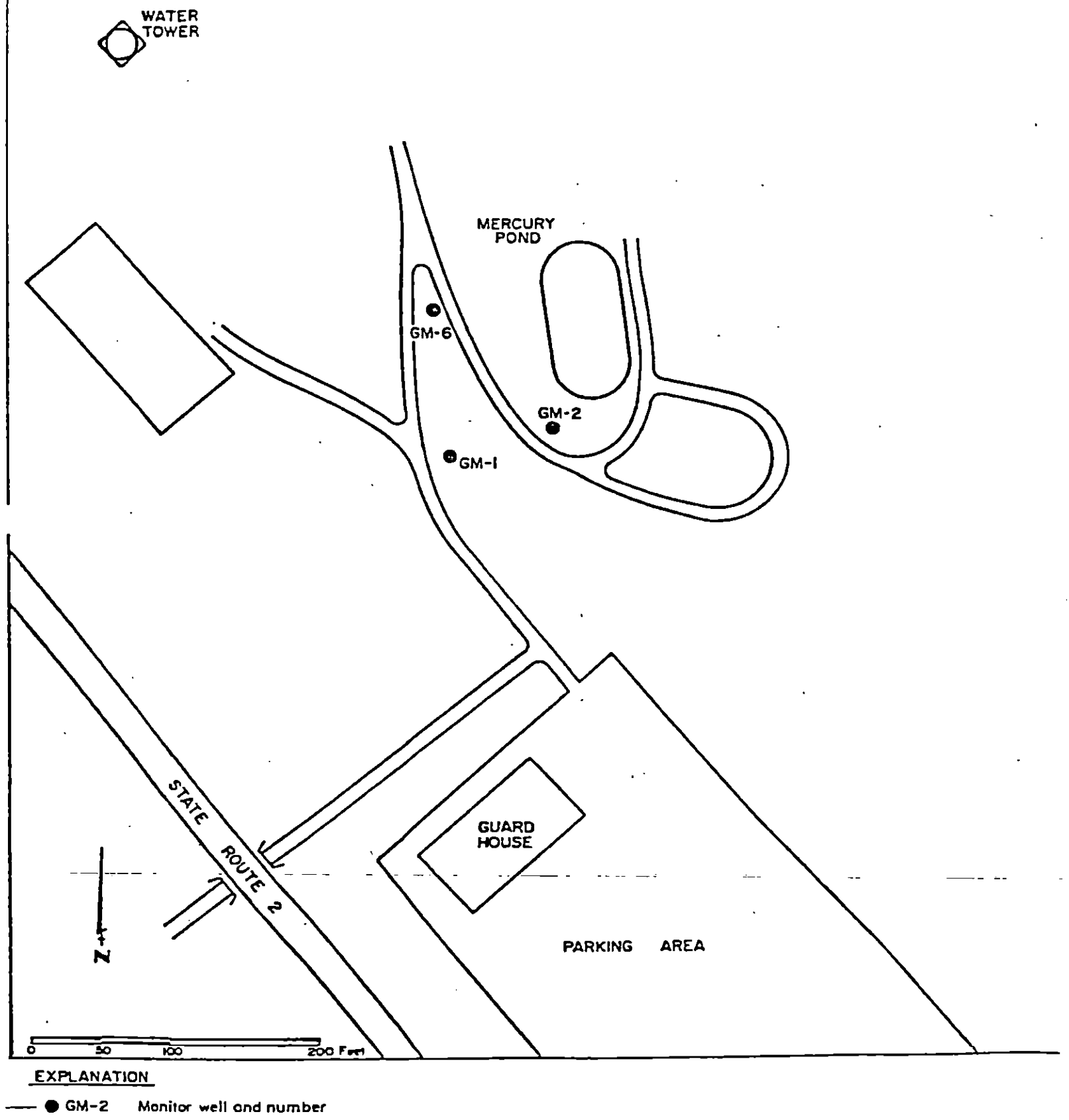



FIGURE 1: MONITOR WELL LOCATION MAP

FIGURE 2. GROUND WATER SAMPLING DATA FORM

Spring/Well Number:_____
Sampled by:_____

Date:_____
Time:_____to_____
Weather:_____

A. GROUND-WATER ELEVATION

(1) Length of Tape Held at Top of Outer Casing:_____ (or) m-scope reading_____

(2) Length of Tape Wet: _____

(3) Depth to Water (1 minus 2):_____

(4) Depth to Well Bottom:_____

(5) Height to Water Column, h (4 minus 3):_____

B. WATER SAMPLING DATA

(1) Volume of water in well = $\pi r^2 h$ = $(3.14)(.083 \text{ ft})^2$ (h) =

_____

(2) Amount of water removed from well:

(3) Was well pumped dry?_____

C. FIELD ANALYSES AND REMARKS

(1) Temperature:_____

(2) Specific Conductance:_____

(3) pH:_____

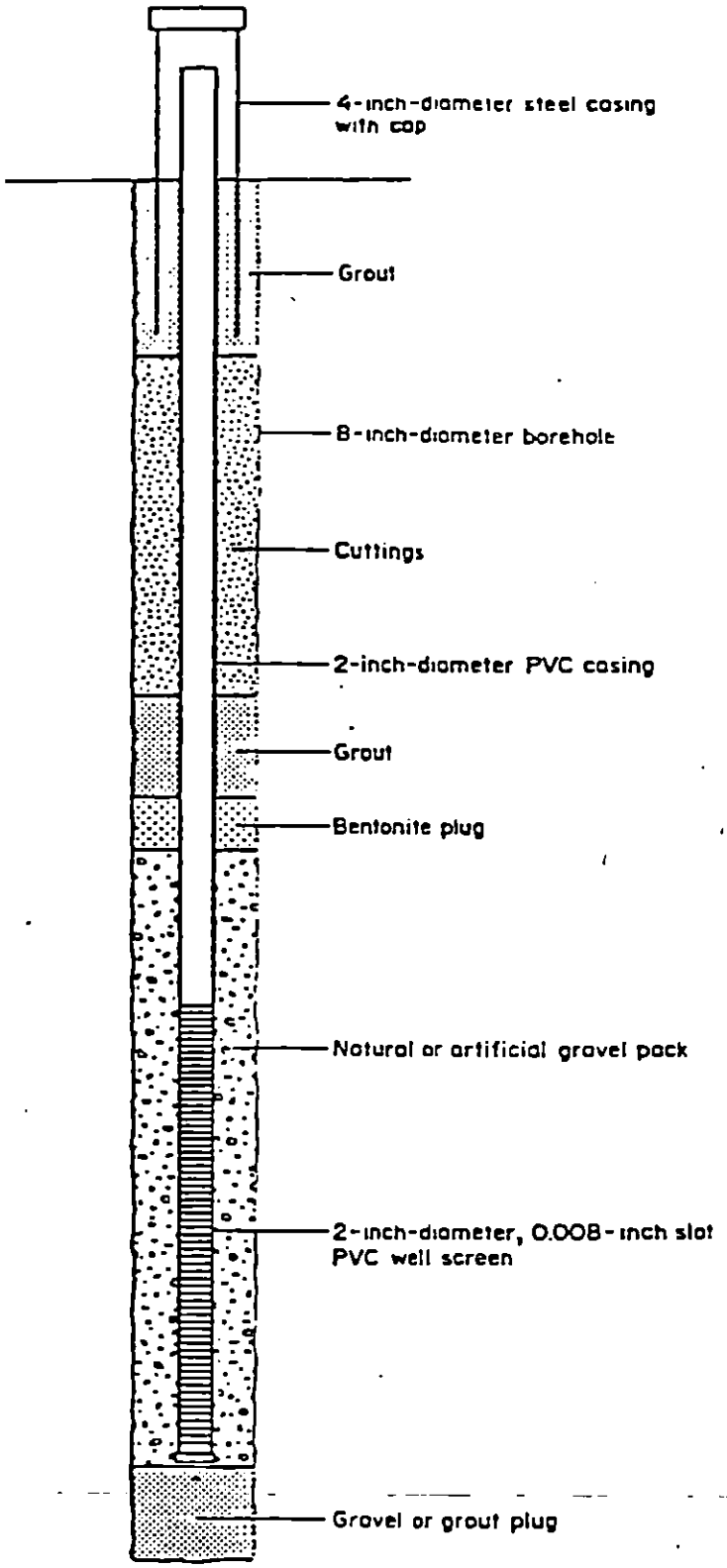
(4) Physical Appearance:_____

(5) Number & Type of Samples Collected:_____

_____

(6) Remarks_____

_____




| Well Number | Elevation* (ft) | Total Depth* (ft) |
|---|---|---|
| GM-1 | 693.10 | 99 |
| GM-2 | 709.88 | 102 |
| GM-6 | 696.90 | 78 |

* Measurement from top of outer casing.

FIGURE 3: ELEVATION AND DEPTH OF MONITOR WELLS

FIGURE 4.

CHAIN OF CUSTODY RECORD - BOTTLE SAMPLE TAG

MERCURY POND: GROUND-WATER MONITORING

SAMPLE # _____ COLLECTION DATE _____ TIME _____

SAMPLE SOURCE _____ PRESERVATIVE _____

SAMPLE COLLECTOR (signature) _____

REMARKS (analysis required, etc.) _____

_____

FRONT

Sample relinquished from: Sample received: Date/Time

_____

Sample relinquished from: Sample received: Date/Time

_____

Sample relinquished from: Sample received: Date/Time

_____

Method of shipment:

BACK

FIGURE 5. CHAIN OF CUSTODY RECORD

SAMPLE COLLECTOR'S NAME:

| DATE | TIME | SAMPLE # | SAMPLE SOURCE | SAMPLE VOLUME | # OF CONTAINERS | ANALYSIS REQUIRED |
|---|---|---|---|---|---|---|
| | | | | | | |

| | | |
|---|---|---|
| Relinquished by: (signature) | Received by: (signature) | Date/Time |
| Relinquished by: (signature) | Received by: (signature) | Date/Time |
| Relinquished by: (signature) | Received by: (signature) | Date/Time |
| Dispatched by: (signature) | Date/Time: | Method of Shipment: |
| Received at Laboratory | Date/Time: | |

APPENDIX I

# TOTAL ORGANIC HALIDE

Method 450.1

Interim

U S. Environmental Protection Agency
Office of Research and Development
Environmental Monitoring and Support Laboratory
Physical and Chemical Methods Branch
Cincinnati, Ohio 45268

November 1980

TOTAL ORGANIC HALIDE

Method 450.1

1. Scope and Application

1.1 This method is to be used for the determination of Total Organic Halides as $Cl^-$ by carbon adsorption, and requires that all samples be run in duplicate. Under conditions of duplicate analysis, the reliable limit of sensitivity is 5 µg/L. Organic halides as used in this method are defined as all organic species containing chlorine, bromine and iodine that are adsorbed by granular activated carbon under the conditions of the method. Fluorine containing species are not determined by this method.

1.2 This is a microcoulometric-titration detection method applicable to the determination of the compound class listed above in drinking and ground waters, as provided under 40 CFR 265.92.

1.3 Any modification of this method, beyond those expressly permitted, shall be considered as major modifications subject to application and approval of alternate test procedures under 40 CFR 260.21.

1.4 This method is restricted to use by, or under the supervision of, analysts experienced in the operation of a pyrolysis/microcolumeter and in the interpretation of the results.

2. Summary of Method

2.1 A sample of water that has been protected against the loss of volatiles by the elimination of headspace in the sampling container, and is free of undissolved solids, is passed through a column containing 40 mg of activated carbon. The column is washed

to remove any trapped inorganic halides, and is then pyrolyzed to convert the adsorbed organohalides to a titratable species that can be measured by a microcoulometric detector.

3. Interferences

3.1 Method interferences may be caused by contaminants, reagents, glassware, and other sample processing hardware. All of these materials must be routinely demonstrated to be free from interferences under the conditions of the analysis by running method blanks.

3.1.1 Glassware must be scrupulously cleaned. Clean all glassware as soon as possible after use by treating with chromate cleaning solution. This should be followed by detergent washing in hot water. Rinse with tap water and distilled water, drain dry, and heat in a muffle furnace at 400°C for 15 to 30 minutes. Volumetric ware should not be heated in a muffle furnace. Glassware should be sealed and stored in a clean environment after drying and cooling, to prevent any accumulation of dust or other contaminants.

3.1.2 The use of high purity reagents and gases help to minimize interference problems.

3.2 Purity of the activated carbon must be verified before use. Only carbon samples which register less than 1000 ng/40 mg should be used. The stock of activated carbon should be stored in its granular form in a glass container with a Teflon seal. Exposure to the air must be minimized, especially during and after milling and sieving the activated carbon. No more than a two-week supply

should be prepared in advance. Protect carbon at all times from all sources of halogenated organic vapors. Store prepared carbon and packed columns in glass containers with Teflon seals.

3.3 This method is applicable to samples whose inorganic-halide concentration does not exceed the organic-halide concentration by more than 20,000 times.

4. Safety

The toxicity or carcinogenicity of each reagent in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current-awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material-handling data sheets should also be made available to all personnel involved in the chemical analysis.

5. Apparatus and Materials (All specifications are suggested. Catalog numbers are included for illustration only).

5.1 Sampling equipment, for discrete or composite sampling

5.1.1 Grab-sample bottle - Amber glass, 250-mL, fitted with Teflon-lined caps. Foil may be substituted for Teflon if the sample is not corrosive. If amber bottles are not available, protect samples from light. The container must be washed and muffled at 400°C before use, to minimize contamination.

5.2 Adsorption System

5.2.1 Dohrmann Adsorption Module (AD-2), or equivalent, pressurized, sample and nitrate-wash reservoirs.

5.2.2 Adsorption columns - pyrex, 5 cm long X 6-mm OD X 2-mm ID.

5.2.3 Granular Activated Carbon (GAC) - Filtrasorb-400, Calgon-APC, or equivalent, ground or milled, and screened to a 100/200 mesh range. Upon combustion of 40 mg of GAC, the apparent-halide background should be 1000-mg $Cl^-$ equivalent or less.

5.2.4 Cerafelt (available from Johns-Manville), or equivalent - Form this material into plugs using a 2-mm ID stainless-steel borer with ejection rod (available from Dohrmann) to hold 40 mg of GAC in the adsorption columns. CAUTION: Do not touch this material with your fingers.

5.2.5 Column holders (available from Dohrman).

5.2.6 Volumetric flasks - 100-mL, 50-mL.

A general schematic of the adsorption system is shown in Figure 1.

5.3 Dohrmann microcoulometric-titration system (MCTS-20 or DX-20), or equivalent, containing the following components:

5.3.1 Boat sampler.

5.3.2 Pyrolysis furnace.

5.3.3 Microcoulometer with integrator.

5.3.4 Titration cell.

A general description of the analytical system is shown in Figure 2.

5.4 Strip-Chart Recorder.

6. Reagents

6.1 Sodium sulfite - 0.1 M, ACS reagent grade (12.6 g/L).

6.2 Nitric acid - concentrated.

6.3 Nitrate-Wash Solution (5000 mg $NO_3^-$/L) - Prepare a nitrate-wash solution by transferring approximately 8.2 gm of potassium nitrate into a 1-litre volumetric flask and diluting to volume with reagent water.

6.4 Carbon dioxide - gas, 99.9% purity.

6.5 Oxygen - 99.9% purity.

6.6 Nitrogen - prepurified.

6.7 70% Acetic acid in water - Dilute 7 volumes of acetic acid with 3 volumes of water.

6.8 Trichlorophenol solution, stock (1 µL = 10 µg $Cl^-$) - Prepare a stock solution by weighing accurately 1.856 gm of trichlorophenol into a 100-mL volumetric flask. Dilute to volume with methanol.

6.9 Trichlorophenol solution, calibration (1 µL = 500 ng $Cl^-$) - Dilute 5 mL of the trichlorophenol stock solution to 100 mL with methanol.

6.10 Trichlorophenol standard, instrument-calibration - First, nitrate wash a single column packed with 40 mg of activated carbon as instructed for sample analysis, and then inject the column with 10 µL of the calibration solution.

6.11 Trichlorophenol standard, adsorption-efficiency (100 µg $Cl^-$/L) - Prepare a adsorption-efficiency standard by injecting 10 µL of stock solution into 1 liter of reagent water.

6.12 Reagent water - Reagent water is defined as a water in which an

interferent is not observed at the method detection limit of each parameter of interest.

6.13 Blank standard - The reagent water used to prepare the calibration standard should be used as the blank standard.

7. Calibration

7.1 Check the adsorption efficiency of each newly-prepared batch of carbon by analyzing 100 mL of the adsorption-efficiency standard, in duplicate, along with duplicates of the blank standard. The net recovery should be within 5% of the standard value.

7.2 Nitrate-wash blanks (Method Blanks) - Establish the repeatability of the method background each day by first analyzing several nitrate-wash blanks. Monitor this background by spacing nitrate-wash blanks between each group of eight pyrolysis determinations.

7.2.1 The nitrate-wash blank values are obtained on single columns packed with 40 mg of activated carbon. Wash with the nitrate solution as instructed for sample analysis, and then pyrolyze the carbon.

7.3 Pyrolyze duplicate instrument-calibration standards and the blank standard each day before beginning sample analysis. The net response to the calibration-standard should be within 3% of the calibration-standard value. Repeat analysis of the instrument-calibration standard after each group of eight pyrolysis determinations, and before resuming sample analysis after cleaning or reconditioning the titration cell or pyrolysis system.

8. Sample Preparation

8.1 Special care should be taken in the handling of the sample to

minimize the loss of volatile organohalides. The adsorption procedure should be performed simultaneously on duplicates.

8.2 Reduce residual chlorine by the addition of sulfite (1 mL of 0.1 M per liter of sample). Addition of sulfite should be done at the time of sampling if the analysis is meant to determine the TOX concentration at the time of sampling. It should be recognized that TOX may increase on storage of the sample. Samples should be stored at 4°C without headspace.

8.3 Adjust pH of the sample to approximately 2 with concentrated $HNO_3$ just prior to adding the sample to the reservoir.

9. Adsorption Procedure

9.1 Connect two columns in series, each containing 40 mg of 100/200-mesh activated carbon.

9.2 Fill the sample reservoir, and pass a metered amount of sample through the activated-carbon columns at a rate of approximately 3 mL/min. NOTE: 100 mL of sample is the preferred volume for concentrations of TOX between 5 and 500 µg/L; 50 mL for 501 to 1000 µg/L, and 25 mL for 1001 to 2000 µg/L.

9.3 Wash the columns-in-series with 2 mL of the 5000-mg/L nitrate solution at a rate of approximately 2 mL/min to displace inorganic chloride ions.

10. Pyrolysis Procedure

10.1 The contents of each column is pyrolyzed separately. After rinsing with the nitrate solution, the columns should be protected from the atmosphere and other sources of contamination until ready for further analysis.

10.2 Pyrolysis of the sample is accomplished in two stages. The volatile components are pyrolyzed in a $CO_2$-rich atmosphere at a low temperature to assure the conversion of brominated trihalomethanes to a titratable species. The less volatile components are then pyrolyzed at a high temperature in an $O_2$-rich atmosphere.

NOTE: The quartz sampling boat should have been previously muffled at 800°C for at least 2 to 4 minutes as in a previous analysis, and should be cleaned of any residue by vacuuming.

10.3 Transfer the contents of each column to the quartz boat for individual analysis.

10.4 If the Dohrmann MC-1 is used for pyrolysis, manual instructions are followed for gas flow regulation. If the MCT-20 is used, the information on the diagram in Figure 3 is used for gas flow regulation.

10.5 Position the sample for 2 minutes in the 200°C zone of the pyrolysis tube. For the MCTS-20, the boat is positioned just outside the furnace entrance.

10.6 After 2 minutes, advance the boat into the 800°C zone (center) of the pyrolysis furnace. This second and final stage of pyrolysis may require from 6 to 10 minutes to complete.

11. Detection

The effluent gases are directly analyzed in the microcoulometric-titration cell. Carefully follow manual instructions for optimizing cell performance.

12. Breakthrough

Because the background bias can be of such an unpredictable nature, it can be especially difficult to recognize the extent of breakthrough of organohalides from one column to another. All second-column measurements for a properly operating system should not exceed 10-percent of the two-column total measurement. If the 10-percent figure is exceeded, one of three events can have happened. Either the first column was overloaded and a legitimate measure of breakthrough was obtained - in which case taking a smaller sample may be necessary; or channeling or some other failure occurred - in which case the sample may need to be rerun; or a high, random, bias occurred and the result should be rejected and the sample rerun. Because knowing which event has occurred may not be possible, a sample analysis should be repeated often enough to gain confidence in results. As a general rule, any analyses that is rejected should be repeated whenever sample is available. In the event that the second-column measurement is equal to or less than the nitrate-wash blank value, the second-column value should be disregarded.

13. Quality Control

13.1 Before performing any analyses. the analyst must demonstrate the ability to generate acceptable accuracy and precision with this procedure by the analysis of appropriate quality-control check samples.

13.2 The laboratory must develop and maintain a statement of method accuracy for their laboratory. The laboratory should update the accuracy statement regularly as new recovery measurements are made.

13.3 It is recommended that the laboratory adopt additional quality-assurance practices for use with this method. The specific practices that would be most productive will depend upon the needs of the laboratory and the nature of the samples. Field duplicates may be analyzed to monitor the precision of the sampling technique. Whenever possible, the laboratory should perform analysis of standard reference materials and participate in relevant performance-evaluation studies.

14. Calculations

OX as $Cl^-$ is calculated using the following formula:

$$\frac{(C_1 - C_3) + (C_2 - C_3)}{V} = \mu g/L \text{ Total Organic Halide}$$

where:

$C_1$ = µg $Cl^-$ on the first column in series

$C_2$ = µg $Cl^-$ on the second column in series

$C_3$ = predetermined, daily, average, method-blank value (nitrate-wash blank for a 40-mg carbon column)

V = the sample volume in L

15. Accuracy and Precision

These procedures have been applied to a large number of drinking-water samples. The results of these analysis are summarized in Tables I and II.

16. Reference

Dressman, R., Najar, G., Redzikowski, R., paper presented at the Proceedings of the American Water Works Association Water Quality Technology Conference, Philadelphia, Dec. 1979.

TABLE I

PRECISION AND ACCURACY DATA FOR MODEL COMPOUNDS

| Model Compound | Dose µg/L | Dose as µg/L Cl | Average % Recovery | Standard Deviation | No. of Replicates |
|---|---|---|---|---|---|
| $CHCl_3$ | 98 | 88 | 89 | 14 | 10 |
| $CHBrCl_2$ | 160 | 106 | 98 | 9 | 11 |
| $CHBr_2Cl$ | 155 | 79 | 86 | 11 | 13 |
| $CHBr_3$ | 160 | 67 | 111 | 8 | 11 |
| Pentachlorophenol | 120 | 80 | 93 | 9 | 7 |

TABLE II

PRECISION DATA ON TAP WATER ANALYSIS

| Sample | Avg. halide ug Cl/L | Standard Deviation | No. of Replicates |
|---|---|---|---|
| A | 71 | 4.3 | 8 |
| B | 94 | 7.0 | 6 |
| C | 191 | 6.1 | 4 |

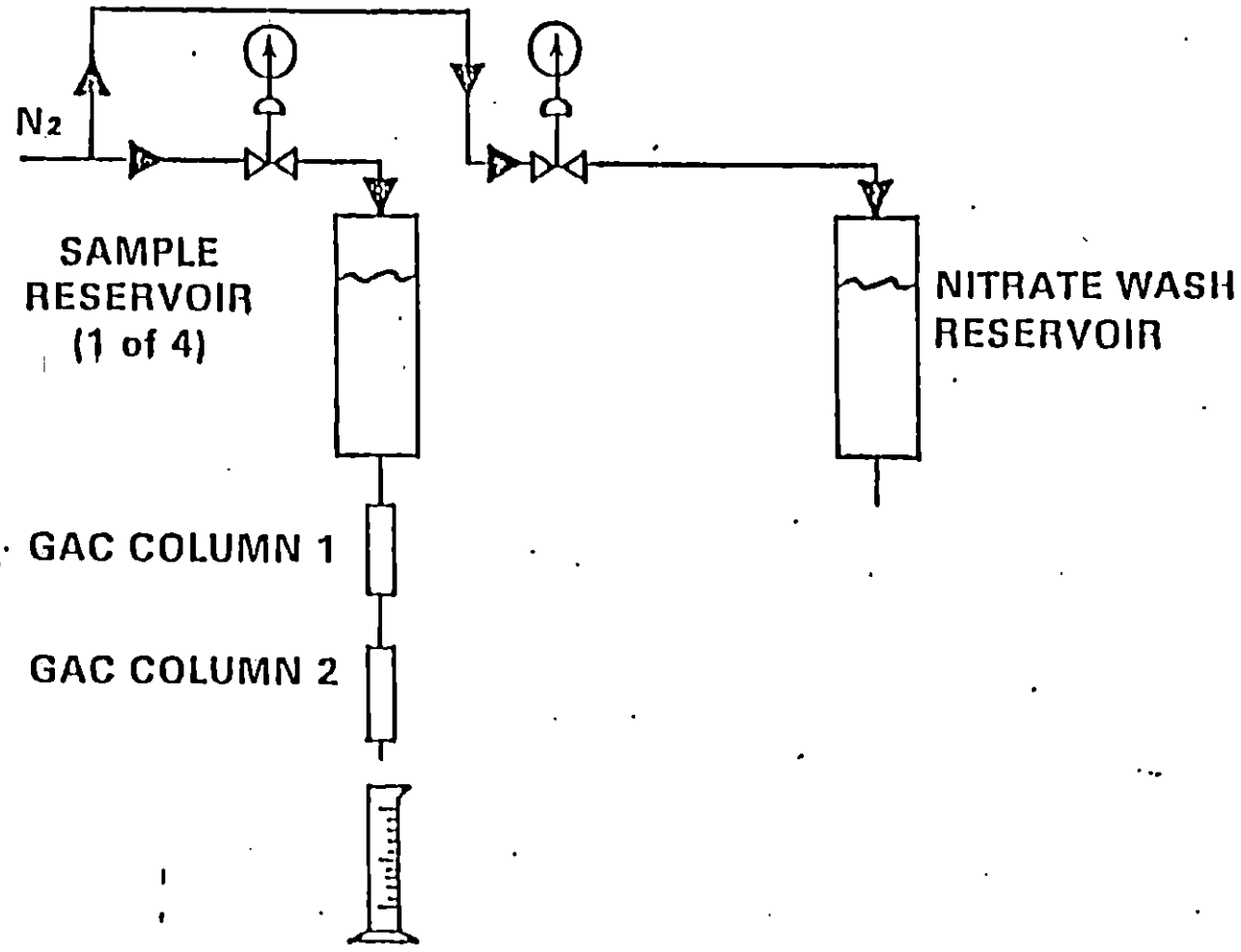



Figure 1. Adsorption Schematic

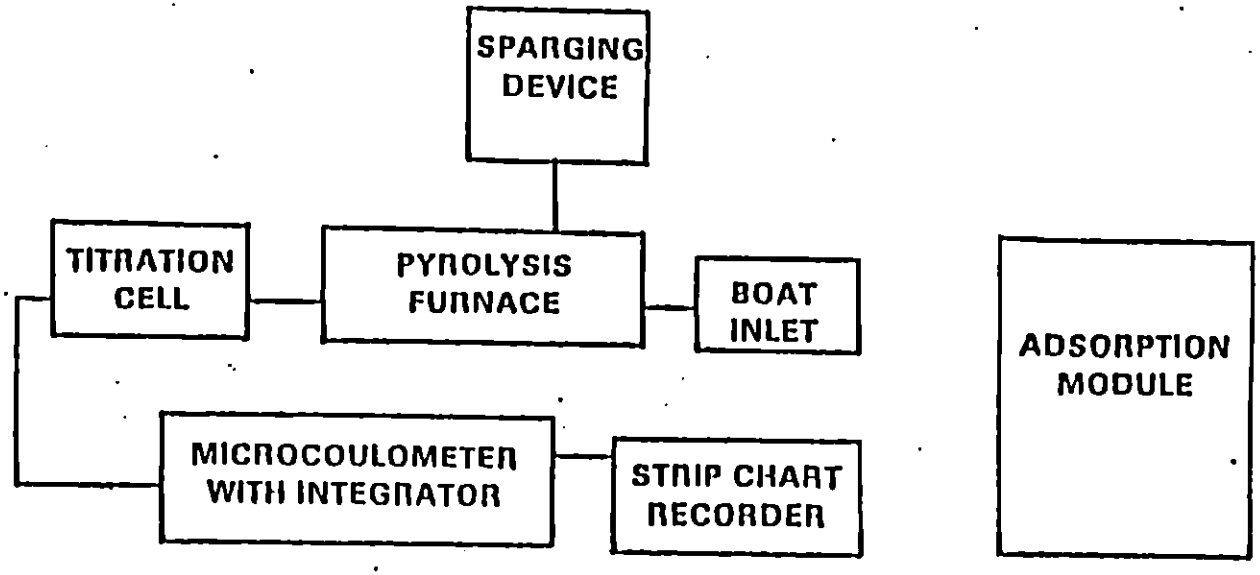



Figure 2. CAOX Analysis System Schematic

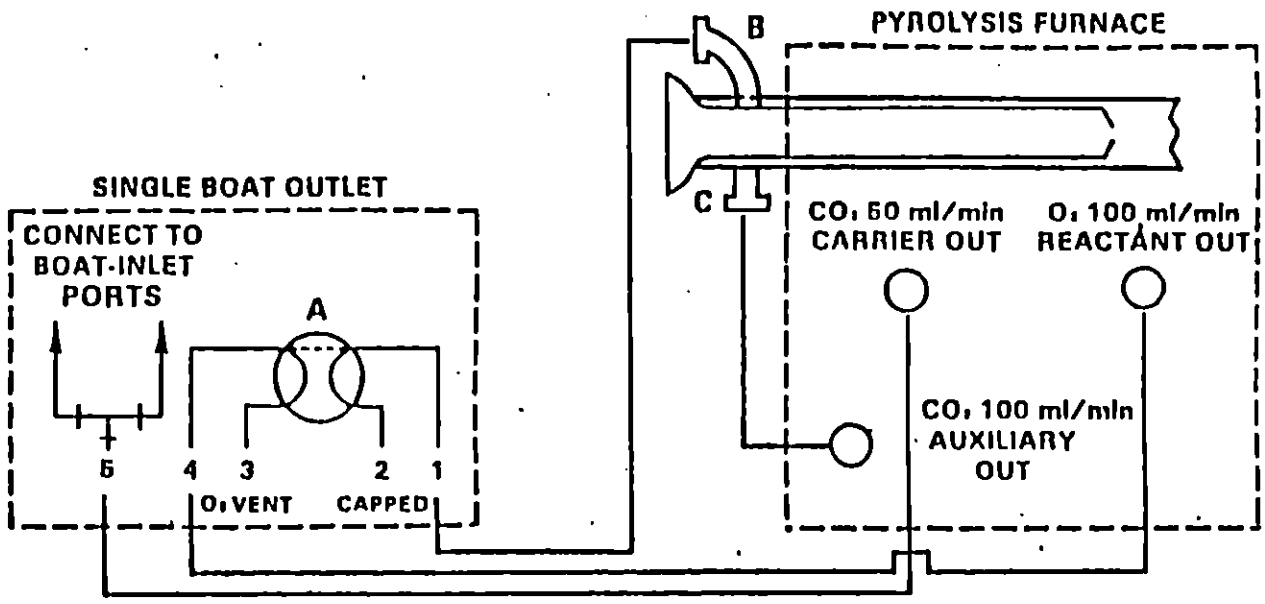



Figure 3. Rear view plumbing schematic for MCTS-20 system. Valve A is set for first-stage combustion, $O_2$ venting (push/pull valve out). Port B enters inner combustion tube; Port C enters outer combustion tube.

APPENDIX II

# TOTAL ORGANIC CARBON, low level
## (UV promoted, persulfate oxidation method)

STORET NO.
LOW LEVEL TOTAL

1. Scope and Application

1.1 This method covers the determination of total organic carbon in drinking water and other waters subject to the limitations in 1.3 and 5.1.

1.2 This instrument is designed for a two-step operation to distinguish between purgeable and nonpurgeable organic carbon. These separate values are not pertinent to this method.

1.3 This method is applicable only to that carbonaceous matter which is either soluble or has a particle size of 0.2 mm or less.

1.4 The applicable range is from approximately 50 ug/l to 10 mg/l. Higher concentrations may be determined by sample dilution.

2. Summary of Method

A sample is combined with 1 ml of acidified persulfate reagent and placed in a sparger. The sample is purged with helium which transfers inorganic $CO_2$ and purgeable organics to a $CO_2$ scrubber. The $CO_2$ is removed with at least 99.9% efficiency with a 2.5-minute purge. The purgeable organics proceed through a reduction system where the gas stream is joined by hydrogen and passed over a nickel catalyst which converts the purgeable organic carbon to methane. The methane is measured by a flame ionization detector. The detector signal is integrated and displayed as the concentration of purgeable organic carbon.

The sample is then transferred to a quartz ultraviolet reaction coil where the nonpurgeable organics are subjected to intense ultraviolet illumination in the presence of the acidified persulfate reagent. The nonpurgeables are converted to $CO_2$ and transferred to a second sparger where a helium purge transfers the $CO_2$ to the reduction system and into the detector. The signal is integrated, added to the purgeable organic carbon value, and displayed as the concentration of total organic carbon.

# APPENDIX A

# MONITORING WELL LOGS

Elevation - top of outer casing:693.10 ft, msl

| Lithologic Description | Depth (ft) | | | Thickness (ft) |
|---|---|---|---|---|
| Sandy loam, red brown | 0 | - | 2 | 2 |
| Clay, cinders, coal, sandstone fragments, red brown, moist | 2 | - | 13 | 11 |
| Gravel, poorly sorted, clayey, red brown, very moist | 13 | - | 18 | 5 |
| Clay, gravelly, coal fragments, red brown | 18 | - | 23 | 5 |
| Sand, medium to coarse grained, well sorted, red brown, coal fragments | 23 | - | 43 | 20 |
| Clay, stiff, red brown to yellow brown, weathered green to gray sandstone fragments | 43 | - | 68 | 25 |
| Silt, clayey, gray to yellow brown, iron stains | 68 | - | 73 | 5 |
| Clay, massive, plastic, gray | 73 | - | 83 | 10 |
| Silt, sandy, gray green to brown, sandstone fragments | 83 | - | 93 | 10 |
| Sand, silty, fine-grained, subrounded yellow brown, brownish-green gravel | 93 | - | 96 | 3 |

GM-2

Elevation - top of outer casing: 709.88 ft, msl

| Lithologic Description | Depth (ft) | Thickness (ft) |
|---|---|---|
| Silt, loam, brown, gravel | 0 - 3 | 3 |
| Clay, silty, brown to yellow brown, sandstone fragments, moist | 3 - 33 | 30 |
| Sand, medium grained, white to orange brown, rock fragments | 33 - 43 | 10 |
| Silt, clayey, tan to gray, wet | 43 - 48 | 5 |
| Clay, plastic, silty, red brown, weathered sandstone and coal fragments | 48 - 93 | 45 |
| Clay, gray to brown, coal and sandstone fragments, sand and silt lenses, moist | 93 - 100 | 7 |
| Mudstone, weathered, friable, gray, dry | 100 - 106 | 6 |

GM-3

Elevation - top of outer casing: 721.99 ft, msl

| Lithologic Description | Depth (ft) | Thickness (ft) |
|---|---|---|
| Clay loam, rock fragments, brown, micaceous, moist | 0 - 3 | 3 |
| Clay, plastic, stiff, rock fragments, brown, moist | 3 - 23 | 20 |
| Silt, clayey, gray-green, mottled, wet | 23 - 33 | 10 |
| Clay, stiff, red brown, sandstone fragments | 33 - 50 | 17 |
| Sandstone, friable, yellow brown to gray green, micaceous | 50 - 55 | 5 |

GM-4

Elevation - land surface: 715 ft, msl

| Lithologic Description | Depth (ft) | Thickness (ft) |
|---|---|---|
| Cinders | 0 - 5 | 5 |
| Sand, silty, medium grained, tan to brown, micaceous, plastic clay lenses | 5 - 6.5 | 1.5 |
| Clay, stiff, red brown, yellow mottling, sandstone and coal fragments, moist | 6.5 - 29 | 22.5 |
| Sand, silty, brown to orange, lenses of plastic clay, sandstone fragments | 29 - 33.5 | 4.5 |
| Silt, sandy, brown, rock fragments, moist | 33.5 - 38 | 4.5 |
| Sand, fine to coarse grained, poorly sorted, brown to tan, wet | 38 - 41.5 | 3.5 |
| Silt, clayey, gray, sandstone fragments, moist | 41.5 - 48 | 6.5 |
| Clay, silty, green to gray, sandstone fragments, micaceous | 48 - 79 | 29 |
| Mudstone, friable, gray to brown, dry | 79 - 81 | 2 |

GM-5

Elevation - top of outer casing: 718.39 ft, msl

| Lithologic Description | Depth (ft) | Thickness (ft) |
|---|---|---|
| Same as GM-4 | 0 - 50 | |

# APPENDIX C

## QUARTERLY WATER QUALITY SAMPLING

MERCURY IMP[illegible]NDMENT
FIRST QUARTERLY MON[illegible]ORING RESULTS
JANUARY 4 1982
(Concentration in mg/ except as noted)

| Parameters | EPA Maximum* Level Standard | MONITORING WELLS GM-0 | GM-1 | GM-2 | GM-6 |
|---|---|---|---|---|---|
| Arsenic | 0.05 | <.005 | 0.043 | 0.014 | 0.009 |
| Barium | 1.0 | 0.070 | 1.2 | 0.58 | 0.27 |
| Cadmium | 0.01 | <.010 | 0.083 | 0.043 | 0.041 |
| Chromium | 0.05 | <.010 | 0.022 | 0.012 | 0.022 |
| Fluoride | 1.4-2.4 | 0.8 | 1.4 | 0.7 | 1.2 |
| Lead | 0.05 | <.010 | 0.031 | 0.018 | 0.016 |
| Mercury | 0.002 | <.0002 | 0.0002 | 0.0002 | 0.0002 |
| Nitrate (as N) | 10 | 7.5 | 0.25 | 0.14 | 1.68 |
| Selenium | 0.01 | <.005 | <.005 | <.005 | <.005 |
| Silver | 0.05 | <.010 | <.010 | <.010 | <.01 |
| Endrin | 0.0002 | <.0002 | <.0002 | <.0002 | <.0002 |
| Lindane | 0.004 | <.0001 | <.0001 | <.001 | <.0001 |
| Methoxychlor | 0.1 | <.003 | <.003 | <.003 | <.003 |
| Toxaphene | 0.005 | <.003 | <.003 | <.003 | <.003 |
| 2,4-D | 0.1 | <.010 | <.010 | <.010 | <.010 |
| 2,4,5-TP Silvex | 0.01 | <.010 | <.010 | <.010 | <.010 |
| Radium 226, 228 pCi/l | 5 pCi/l | <0.6, <1 | 5.9 ±1.1, 3.1 ±1.4 | <.6, <1 | 2.6 ±.8, 3.1 ±.2 |
| Gross Alpha pCi/l | 15 pCi/l | <2 | 16 ±9 | <2 | 12 ±9 |
| Gross Beta pCi/l | 4 milli Rem/yr | <3 | 43 ±9 | 19 ±6 | 13 ±5 |
| Coliform Bacteria | 1/100 ml | <1 | 1500 | 500 | 54,000 |

*Section 265.92 (b)(1), Appendix III - EPA Interim Primary Drinking Water Standards, FR Vol. 45, No. 98, 5/19/80 33257

MERCURY IMPOUNDMENT
SECOND QUARTERLY MONITORING RESULTS
May 10, 1982
(Concentration in mg/l except as noted)

| Parameters | EPA Maximum* Level Standard | MONITORING WELLS GM-0 | GM-1 | GM-2 | GM-6 |
|---|---|---|---|---|---|
| Arsenic | 0.05 | <.005 | 0.043 | 0.009 | <.005 |
| Barium | 1.0 | .064 | 1.1 | 0.44 | 0.16 |
| Cadmium | 0.01 | <.003 | 0.026 | 0.036 | 0.004 |
| Chromium | 0.05 | .011 | 0.017 | 0.020 | 0.014 |
| Fluoride | 1.4-2.4 | 1.0 | 1.0 | 1.0 | 2.0 |
| Lead | 0.05 | <.005 | 0.016 | 0.012 | <.005 |
| Mercury | 0.002 | .0002 | 0.0002 | <0.0002 | 0.0002 |
| Nitrate (as N) | 10 | 6.8 | 1.5 | 0.6 | 1.0 |
| Selenium | 0.01 | <.005 | <.005 | <.005 | <.005 |
| Silver | 0.05 | <.004 | <.004 | <.004 | <.004 |
| Endrin | 0.0002 | <.0002 | <.0002 | <.0002 | <.0002 |
| Lindane | 0.004 | <.004 | <.004 | <.004 | <.004 |
| Methoxychlor | 0.1 | <.005 | <.005 | <.005 | <.005 |
| Toxaphene | 0.005 | <.005 | <.005 | <.005 | <.005 |
| 2,4-D | 0.1 | <.010 | <.010 | <.010 | <.010 |
| 2,4,5-TP Silvex | 0.01 | <.010 | <.010 | <.010 | <.010 |
| Radium 226, 228 pCi/l | 5 pCi/l | <1.6 | 2.4 ± 1.2 | 1.2 ± 1 | <1.6 |
| Gross Alpha pCi/l | 15 pCi/l | <2 | <2 | <2 | <2 |
| Gross Beta pCi/l | 4 milli Rem/yr | <3 | <3 | <3 | <3 |
| Coliform Bacteria | 1/100 ml | <1 | <20 | <5 | <20 |

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*Section 265.92 (b)(1), Appendix III - EPA Interim Primary Drinking Water Standards, FR Vol. 45, No. 98, 5/19/80 33257

MERCURY IMPOUNDMENT
THIRD QUARTERLY MONITORING RESULTS
August 3, 1982
(Concentration in mg/l except as noted)

| Parameters | EPA Maximum* Level Standard | MONITORING WELLS GM-0 | GM-1 | GM-2 | GM-6 |
|---|---|---|---|---|---|
| Arsenic | 0.05 | <0.005 | 0.054 | 0.012 | <0.005 |
| Barium | 1.0 | 0.070 | 0.832 | 0.355 | 0.247 |
| Cadmium | 0.01 | <0.004 | 0.063 | 0.030 | <0.004 |
| Chromium | 0.05 | 0.006 | 0.017 | 0.010 | 0.010 |
| Fluoride | 1.4-2.4 | 1.3 | 2.0 | 1.0 | 2.0 |
| Lead | 0.05 | 0.014 | 0.736 | 0.003 | 0.030 |
| Mercury | 0.002 | 0.0001 | 0.0002 | 0.0001 | 0.0003 |
| Nitrate (as N) | 10 | 4.6 | 0.54 | 0.50 | 0.77 |
| Selenium | 0.01 | <0.005 | <0.005 | <0.005 | <0.005 |
| Silver | 0.05 | <0.004 | 0.005 | 0.005 | 0.005 |
| Endrin | 0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Lindane | 0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Methoxychlor | 0.1 | <0.10 | <0.10 | <0.10 | <0.10 |
| Toxaphene | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4-D | 0.1 | <0.10 | <0.10 | <0.10 | <0.10 |
| 2,4,5-TP Silvex | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Radium 226, 228 pCi/l | 5 pCi/l | <1.6 | <1.6 | <1.6 | <1.6 |
| Gross Alpha,pCi/l | 15 pCi/l | <2 | <2 | <2 | <2 |
| Gross Beta pCi/l | 4 milli Rem/yr | 7 | 3 | 3 | <3 |
| Coliform Bacteria | 1/100 ml | <1 | <1 | <5 | <5 |

*Section 265.92(b)(1), Appendix III - EPA Interim Primary Drinking Water Standards, FR Vol. 45, No. 98, 5/19/80 33257

MERCURY IMPOUNDMENT
FOURTH QUARTERLY MONITORING RESULTS
November 15, 1982
(Concentration in mg/l except as noted)

| Parameters | EPA Maximum* Level Standard | MONITORING WELLS GM-0 | GM-1 | GM-2 | GM-6 |
|---|---|---|---|---|---|
| Arsenic | 0.05 | <0.005 | 0.095 | 0.019 | 0.011 |
| Barium | 1.0 | 0.074 | 1.40 | 0.360 | 0.650 |
| Cadmium | 0.01 | <0.010 | 0.010 | 0.010 | <0.010 |
| Chromium | 0.05 | <0.010 | 0.010 | <0.010 | <0.010 |
| Fluoride | 1.4-2.4 | 2.0 | 1.0 | 1.0 | 1.0 |
| Lead | 0.05 | 0.016 | 0.045 | <0.005 | 0.240 |
| Mercury | 0.002 | <0.0005 | <0.0005 | <0.0005 | 0.0009 |
| Nitrate (as N) | 10 | 4.1 | 0.14 | 0.13 | 0.29 |
| Selenium | 0.01 | <0.005 | <0.005 | <0.005 | <0.005 |
| Silver | 0.05 | 0.010 | 0.010 | <0.010 | 0.010 |
| Endrin | 0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Lindane | 0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Methoxychlor | 0.1 | <0.100 | <0.100 | <0.100 | <0.100 |
| Toxaphene | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| 2,4-D | 0.1 | <0.100 | <0.100 | <0.100 | <0.100 |
| 2,4,5-TP Silvex | 0.01 | <0.010 | <0.010 | <0.010 | <0.010 |
| Radium 226, 228 pCi/l | 5 pCi/l | <1 | <1 | <1 | insuff. sample |
| Gross Alpha pCi/l | 15 pCi/l | <1 | <1 | 5 | |
| Gross Beta pCi/l | 4 milli Rem/yr. | <5 | <5 | <5 | |
| Coliform Bacteria | 1/100 ml | <1 | 60 | <1 | <1 |

*Section 265.92(b)(1), Appendix III - EPA Interim Primary Drinking Water Standards, FR Vol. 45, No. 98, 5/19/80 33257

# APPENDIX D

# WATER QUALITY ASSESSMENT PROGRAM

PROPOSED WATER QUALITY ASSESSMENT PROGRAM
MERCURY SURFACE IMPOUNDMENT

Objective

Determine if the mercury surface impoundment is responsible for "higher-than-background" levels of TOC and specific conductivity (SC) in downgradient monitor wells GM-1, GM-2, and GM-6.

Basic Approach

- Collect two separate sets of water samples from the mercury surface impoundment and monitor wells GM-1, GM-2, and GM-6.
- Analyze each set of water samples for important water quality parameters including (but not limited to): pH, specific conductance, TOC, TDS, bicarbonate, chloride, sulfate, calcium, magnesium, sodium, potassium, iron, manganese, silica, and mercury.
- Evaluate results of chemical analyses and identify specific parameters and parameter relationships (e.g., Na/Cl ratios, main contributors to SC, major and minor constituents, etc.) that characterize each fluid sample.
- Compare the chemical makeup of mercury surface impoundment fluids with that of groundwater in downgradient wells, and assess the extent to which the surface impoundment may possibly contribute to observed downgradient water quality.
- If, from this evaluation, the mercury surface impoundment does not appear to be the cause of the statistically significant change, notify the EPA Region Administrator within 15 days of the determination and resume the normal indicator evaluation program under 40CFR265.92 and 265.93(b).
- If the mercury surface impoundment does appear to represent a likely source for "higher-than-background" TOC and/or SC levels, identify the specific organic and/or inorganic parameters that are responsible for observed downgradient conditions. (Note: If required, this step may involve additional sampling and analyses of groundwater and surface impoundment fluids.)
- Prepare a report to EPA Region documenting the relevant findings of the proposed investigation, including the rationale and supporting data used to interpret water quality trends.

## Tentative Schedule

| Task | Time Interval |
|---|---|
| Collect and analyze fluid samples from the mercury surface impoundment and downgradient wells GM-1, GM-2, and GM-6. | Oct. 10 to Nov. 28 |
| Evaluate results of chemical analyses and interpret water quality trends. | Nov. 28 to Dec. 5 |
| Prepare a report to EPA Region of the proposed investigation documenting findings | Dec. 5 to Dec. 15 |

# APPENDIX E

# SPLIT SAMPLING RESULTS

Chemical Division
LABORATORY DEPT.

Date Rec'd.: 3-23-84

W.O. # 63552

Type Sample: GM - Hg Pond Series

Sample No.: GM-0 0898

Submitted By: _____

Dept.: Technical

Report To: _____

Date Reported: 5-14-84

Notebook No.: _____

Page No.: _____

| | ANALYSIS REQUIRED | UNITS | REPLICATES | GUIDE LIMITS | RESULTS |
|---|---|---|---|---|---|
| GROUND $H_2O$ CONTAM. INDICATORS | pH | | 4 | 6.5 - 8.5 | 7.0 6.9 6.9 7.0 |
| | Specific Cond. | uMhos | 4 | | 698 711 706 700 |
| | TOC | mg/l | 4 | | 11.3 9.7 8.6 8.2 |
| | TOX | ug/l Cl | 4 | | 90 80 80 50 |
| GROUND $H_2O$ QUALITY PARAMETERS | Cl | mg/l | 1 | - 250 mg/l | 22 |
| | $SO_4$ | mg/l | 1 | -250 mg/l | 35 |
| | Fe | mg/l | 1 | -0.3 mg/l | <0.1 |
| | Mn | mg/l | 1 | -0.05 mg/l | <0.01 |
| | Na | mg/l | 1 | | 13.2 |
| | Phenol | mg/l | 1 | | .007 |
| ADDITIONAL | Alkalinity($CaCO_3$) | mg/l | 1 | | 204 |
| | Alkalinity($HCO_3$) | mg/l | 1 | | 249 |
| | Color | APHA | 1 | -15 | <5 |
| | TDS | mg/l | 1 | -500 mg/l | 398 |
| | Ca | mg/l | 1 | | 116. |
| | Cu | mg/l | 1 | -1 mg/l | <0.01 |
| | K | mg/l | 1 | | 2.00 |
| | Zn | mg/l | 1 | -5 mg/l | <0.1 |
| | Mg | mg/l | 1 | | 10.0 |
| | V | mg/l | 1 | | <0.01 |
| | Hg | ug/l | 1 | -2 ug/l | 0.2 |
| | Pb | mg/l | 1 | -0.05 | <0.005 |

Chemical Division
LABORATORY DEPT

Date Rec'd.: 3-23-84 W.O. # 63552

Type Sample: GM - 11 Pond Series Sample No.: GM-1

Submitted By: _____ Dept.: Technical

Report To: _____ Date Reported: 5-14-84

Notebook No.: _____ Page No.: _____

| | ANALYSIS REQUIRED | UNITS | REPLICATES | GUIDE LIMITS | RESULTS |
|---|---|---|---|---|---|
| GROUND $H_2O$ CONTAM. INDICATORS | pH | | 4 | 6.5 - 8.5 | 7.1 7.1 7.1 7.1 |
| | Specific Cond. | uMhos | 4 | | 1120 1170 1180 1192 |
| | TOC | mg/l | 4 | | 30.3 29.1 25.8 25.1 |
| | TOX | ug/l Cl | 4 | | 20. 20. <20. <20. |
| GROUND $H_2O$ QUALITY PARAMETERS | Cl | mg/l | 1 | - 250 mg/l | 18 |
| | $SO_4$ | mg/l | 1 | -250 mg/l | 3 |
| | Fe | mg/l | 1 | -0.3 mg/l | 0.1 |
| | Mn | mg/l | 1 | -0.05 mg/l | 0.91 |
| | Na | mg/l | 1 | | 119. |
| | Phenol | mg/l | 1 | | .008 |
| ADDITIONAL | Alkalinity($CaCO_3$) | mg/l | 1 | | 603 |
| | Alkalinity($HCO_3$) | mg/l | 1 | | 736 |
| | Color | APHA | 1 | -15 | <5 |
| | TDS | mg/l | 1 | -500 mg/l | 633 |
| | Ca | mg/l | 1 | | 97.2 |
| | Cu | mg/l | 1 | -1 mg/l | <0.01 |
| | K | mg/l | 1 | | 1.30 |
| | Zn | mg/l | 1 | -5 mg/l | 0.3 |
| | Mg | mg/l | 1 | | 26.1 |
| | V | mg/l | 1 | | 0.01 |
| | Hg | ug/l | 1 | -2 ug/l | 0.2 |
| | Pb | mg/l | 1 | -0.05 mg/l | <0.005 |

Chemical Division
LABORATORY DEPT.

Date Rec'd.: 3-23-94 W.O. # 63552 C

Type Sample: GM-Hg Pond Series Sample No.: GM-2

Submitted By: Dept.: Technical

Report To: Date Reported: 5-14-84

Notebook No.: Page No.:

| | ANALYSIS REQUIRED | UNITS | REPLICATES | GUIDE LIMITS | RESULTS |
|---|---|---|---|---|---|
| GROUND H2O CONTAM. INDICATORS | pH | | 4 | 6.5 - 8.5 | 7.0 7.1 7.1 7.1 |
| | Specific Cond. | uMhos | 4 | | 1400 1420 1420 1410 |
| | TOC | mg/l | 4 | | 16.2 15.0 13.8 13.1 |
| | TOX | ug/l Cl | 4 | | <20 20 <20 <20 |
| GROUND H2O QUALITY PARAMETERS | Cl | mg/l | 1 | - 250 mg/l | 49 |
| | $SO_4$ | mg/l | 1 | -250 mg/l | 5 |
| | Fe | mg/l | 1 | -0.3 mg/l | 0.1 |
| | Mn | mg/l | 1 | -0.05 mg/l | 1.34 |
| | Na | mg/l | 1 | | 171. |
| | Phenol | mg/l | 1 | | INSUFFICIENT SAMPLE |
| ADDITIONAL | Alkalinity($CaCO_3$) | mg/l | 1 | | 562 |
| | Alkalinity($HCO_3$) | mg/l | 1 | | 686 |
| | Color | APHA | 1 | -15 | <5 |
| | TDS | mg/l | 1 | -500 mg/l | 583 |
| | Ca | mg/l | 1 | | 95.1 |
| | Cu | mg/l | 1 | -1 mg/l | <0.01 |
| | K | mg/l | 1 | | 2.90 |
| | Zn | mg/l | 1 | -5 mg/l | 0.1 |
| | Mg | mg/l | 1 | | 20.0 |
| | V | mg/l | 1 | | <0.01 |
| | Hg | ug/l | 1 | -2 ug/l | 0.2 |
| | Pb | mg/l | 1 | 0.05 | <0.005 |

PPG INDUSTRIES, INC.
*Chemical Division — Natrium*
LABORATORY DEPT.

Date Rec'd.: 3-23-84 W.O. # 6355

Type Sample: GM - Ha Pond Series Sample No.: GM-5

Submitted By: Dept.: Technical

Report To: Date Reported: 5-14-84

Notebook No.: Page No.:

| | ANALYSIS REQUIRED | UNITS | REPLICATES | GUIDE LIMITS | RESULTS |
|---|---|---|---|---|---|
| GROUND $H_2O$ CONTAM. INDICATORS | pH | | 4 | 6.5 - 8.5 | 6.8 6.9 6.9 6.9 |
| | Specific Cond. | uMhos | 4 | | 856 865 867 869 |
| | TOC | mg/l | 4 | | 1.5 1.5 1.5 1.5 |
| | TOX | ug/l Cl | 4 | | <20 <20 <20 <20 |
| GROUND $H_2O$ QUALITY PARAMETERS | Cl | mg/l | 1 | - 250 mg/l | 32 |
| | $SO_4$ | mg/l | 1 | -250 mg/l | 29 |
| | Fe | mg/l | 1 | -0.3 mg/l | <0.1 |
| | Mn | mg/l | 1 | -0.05 mg/l | 0.23 |
| | Na | mg/l | 1 | | 42.9 |
| | Phenol | mg/l | 1 | | .003 |
| ADDITIONAL | Alkalinity($CaCO_3$) | mg/l | 1 | | 307 |
| | Alkalinity($HCO_3$) | mg/l | 1 | | 375 |
| | Color | APHA | 1 | -15 | <5 |
| | TDS | mg/l | 1 | -500 mg/l | 450 |
| | Ca | mg/l | 1 | | 112. |
| | Cu | mg/l | 1 | -1 mg/l | <0.01 |
| | K | mg/l | 1 | | 1.50 |
| | Zn | mg/l | 1 | -5 mg/l | 0.1 |
| | Mg | mg/l | 1 | | 21.5 |
| | V | mg/l | 1 | | <0.01 |
| | Hg | ug/l | 1 | -2 ug/l | 0.3 |
| | Pb | mg/l | 1 | -0.05 mg/l | <0.005 |

Chemical Division
LABORATORY DEPT

Date Rec'd.: 3-23-84

W.O. # 63552

Type Sample: GM - Hg Pond Series

Sample No.: GM-6

Submitted By:

Dept.: Technical

Report To:

Date Reported: 5-14-84

Notebook No.:

Page No.:

| | ANALYSIS REQUIRED | UNITS | REPLICATES | GUIDE LIMITS | RESULTS |
|---|---|---|---|---|---|
| GROUND $H_2O$ CONTAM. INDICATORS | pH | | 4 | 6.5 - 8.5 | 6.9 7.0 7.0 7.0 |
| | Specific Cond. | uMhos | 4 | | 1120 1130 1130 1130 |
| | TOC | mg/l | 4 | | 5.2 5.1 5.1 5.1 |
| | TOX | ug/l Cl | 4 | | 70. 70 60. 70. |
| GROUND $H_2O$ QUALITY PARAMETERS | Cl | mg/l | 1 | - 250 mg/l | 61 |
| | $SO_4$ | mg/l | 1 | -250 mg/l | 71 |
| | Fe | mg/l | 1 | -0.3 mg/l | <0.1 |
| | Mn | mg/l | 1 | -0.05 mg/l | 0.25 |
| | Na | mg/l | 1 | | 91.6 |
| | Phenol | mg/l | 1 | | INSUFFICIENT SAMPLE |
| ADDITIONAL | Alkalinity($CaCO_3$) | mg/l | 1 | | 263 |
| | Alkalinity($HCO_3$) | mg/l | 1 | | 321 |
| | Color | APHA | 1 | -15 | 25 |
| | TDS | mg/l | 1 | -500 mg/l | 570 |
| | Ca | mg/l | 1 | | 56.6 |
| | Cu | mg/l | 1 | -1 mg/l | <0.01 |
| | K | mg/l | 1 | | 2.40 |
| | Zn | mg/l | 1 | -5 mg/l | 0.1 |
| | Mg | mg/l | 1 | | 5.5 |
| | V | mg/l | 1 | | <0.01 |
| | Hg | ug/l | 1 | ug/l | <0.2 |
| | Pb | mg/l | 1 | mg/l | <0.005 |

Chemical Division —
LABORATORY DEPT.

Date Rec'd.: 3-23-84 W.O. # 63552C

Type Sample: GM-Ha-Panel Series Sample No.: GM-7

Submitted By: Dept.: Technical

Report To: Date Reported: 5-14-84

Notebook No.: Page No.:

| | ANALYSIS REQUIRED | UNITS | REPLICATES | GUIDE LIMITS | RESULTS |
|---|---|---|---|---|---|
| GROUND $H_2O$ CONTAM. INDICATORS | pH | | 4 | 6.5 - 8.5 | 6.7 6.7 6.7 6.8 |
| | Specific Cond. | uMhos | 4 | | 1213 1340 1248 1238 |
| | TOC | mg/l | 4 | | 9.2 8.6 8.4 7.6 |
| | TOX | ug/l Cl | 4 | | <20 <20 20 20 |
| GROUND $H_2O$ QUALITY PARAMETERS | Cl | mg/l | 1 | - 250 mg/l | 62 |
| | $SO_4$ | mg/l | 1 | -250 mg/l | 25 |
| | Fe | mg/l | 1 | -0.3 mg/l | <0.1 |
| | Mn | mg/l | 1 | -0.05 mg/l | 3.70 |
| | Na | mg/l | 1 | | 86.4 |
| | Phenol | mg/l | 1 | | Insufficient Sample |
| ADDITIONAL | Alkalinity($CaCO_3$) | mg/l | 1 | | 344 |
| | Alkalinity($HCO_3$) | mg/l | 1 | | 420 |
| | Color | APHA | 1 | -15 | <5 |
| | TDS | mg/l | 1 | -500 mg/l | 460 |
| | Ca | mg/l | 1 | | 112. |
| | Cu | mg/l | 1 | -1 mg/l | <0.01 |
| | K | mg/l | 1 | | 1.80 |
| | Zn | mg/l | 1 | -5 mg/l | 0.1 |
| | Mg | mg/l | 1 | | 20.9 |
| | V | mg/l | 1 | | <0.01 |
| | Hg | ug/l | 1 | -2 ug/l | 0.2 |
| | Pb | mg/l | 1 | -0.05 | <0.005 |

Date received: 3-30-84

U.O. # 635520

Sampled by:

Dept. Environmental

Report To:

Date reported: 4-9-84

Data stored: Lab file.

TABLE II

Well Water Samples

| | Parts Per Million Chlorobenzenes Etc. Compounds* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Well | Benzene | MCB | 1,1,2,2 $C_2H_2Cl_4$ | Meta DCB | Para DCB | Ortho DCB | 1,2,4 TCB | 1,2,3 TCB | $C_2Cl_6$ | # of Unknowns |
| 08984-GM-0 | .02 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | 1 |
| 08984-GM-1 | .03 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | 0 |
| 08984-GM-2 | .02 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | 0 |
| 08984-GM-5 | .01 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | <.01 | 1 |
| 08984-GM-6 | .02 | <.01 | <.01 | <.01 | <.01 | .02 | <.01 | <.01 | <.01 | 1 |
| 08984-GM-7 | <.01 | <.01 | <.01 | <.01 | <.01 | .02 | <.01 | <.01 | <.01 | 0 |
| | | | | | | | | | | |
| | | | | | | | | | | |

*Flame Ionization G/C - $CS_2$ Extraction

Date received 3-30-84
Sampled by:
Report to:
Data stored: Lab file

W.O. # 633520
Dept: Environmental
Date reported: 4-9-84

TABLE I

Well Water Samples

Parts Per Billion Chloro $C_1$ & $C_2$ Compounds*

| Well | $CH_2Cl_2$ | $CHCl_3$ | 111 $C_2H_3Cl_3$ and or 1,2 $C_2H_4Cl_2$ | $CCl_4$ | $C_2HCl_3$ | $C_2Cl_4$ | # of Unknowns |
|---|---|---|---|---|---|---|---|
| 08984-GM-0 | < 1 | < 1 | < 1 | < 1 | 7. | 153. | 1 |
| 08984-GM-1 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 0 |
| 08984-GM-2 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 0 |
| 08984-GM-5 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 0 |
| 08984-GM-6 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 0 |
| 08984-GM-7 | < 1 | < 1 | < 1 | < 1 | < 1 | < 1 | 0 |
| | | | | | | | |
| | | | | | | | |

*Tracor 700 A (Hall Electrolytic Conductivity Detector) G/C - Headspace Technique
Samples & Standards Equilibrated at 40°C ± 0.1°C.

PEDCO ENVIRONMENTAL, INC.
11499 CHESTER ROAD
CINCINNATI, OHIO 45246
(513) 782-4700

# LABORATORY ANALYSIS REPORT

SAMPLE TYPE: WELL WATERS

CLIENT: U.S. EPA
OFFICE OF SOLID WASTE

ATTN: MR. WILLIAM MYERS

PROJECT NO: 3627-1
REQUISITION: 5414
RECEIVED: 3/30/84
SAMPLE SITE:

REPORTED: 5/10/84

| SAMPLE ID | GM-0 | GM-1 | GM-2 |
|---|---|---|---|
| PEDCO NO. | DL219 | DL220 | DL221 |
| PARAMETER, UNITS | | | |
| PH, SU | 7.12 | 7.40 | 7.58 |
| ALKALINITY, MG/L CACO3 | 186 | 576 | 568 |
| SPECIFIC CONDUCTANCE, UMHOS | 601 | 1020 | 1170 |
| DISSOLVED SOLIDS, MG/L | 399 | 634 | 721 |
| CHLORIDE, MG/L | 19.2 | <0.3 | <0.3 |
| SULFATE, MG/L | 87.4 | 2.7 | 5.7 |
| COLOR, CHLOROPLATINATE NO. | <1 | 17 | 6 |
| PHENOLICS, MG/L | <0.03 | <0.03 | NR |
| TOTAL ORGANIC CARBON, MG/L | 6.4 | 2.0 | 2.0 |
| TOTAL ORGANIC HALOGEN, UG/L | 93 | 28 | NR |
| CALCIUM, MG/L | 130 | 118 | 113 |
| COPPER, UG/L | 6.1 | 0.8 | 3.2 |
| IRON, UG/L | 34 | 34 | 24 |
| MAGNESIUM, MG/L | 8.92 | 25.1 | 19.3 |
| MANGANESE, MG/L | 0.004 | 0.913 | 1.31 |
| MERCURY, UG/L | <0.1 | <0.1 | <0.1 |
| POTASSIUM, MG/L | 1.78 | 1.70 | 3.96 |
| SODIUM, MG/L | 12.5 | 140 | 187 |
| VANADIUM, UG/L | 22 | <7 | <7 |
| ZINC, MG/L | 0.15 | 0.13 | 0.15 |

NR = NOT REQUESTED

SUBMITTED BY: Craig H Caldwell

PEDCO ENVIRONMENTAL, INC.
11499 CHESTER ROAD
CINCINNATI, OHIO 45246
(513) 782-4700

# LABORATORY ANALYSIS REPORT

SAMPLE TYPE: WELL WATERS

CLIENT: U.S. EPA
OFFICE OF SOLID WASTE

ATTN: MR. WILLIAM MYERS

PROJECT NO: 3627-1
REQUISITION: 5414
RECEIVED: 3/30/84
SAMPLE SITE:

REPORTED: 5/10/84

| SAMPLE ID<br>PEDCO NO.<br>PARAMETER, UNITS | GM-5<br>DL222 | GM-6<br>DL223 | GM-7<br>DL224 |
|---|---|---|---|
| PH, SU | 7.38 | 7.49 | 7.83 |
| ALKALINITY, MG/L CACO3 | 320 | 232 | 434 |
| SPECIFIC CONDUCTANCE, UMHOS | 731 | 883 | 984 |
| DISSOLVED SOLIDS, MG/L | 452 | 585 | 599 |
| CHLORIDE, MG/L | 1.1 | 56.0 | 1.1 |
| SULFATE, MG/L | 51.2 | 161 | 28.2 |
| COLOR, CHLOROPLATINATE NO. | 6 | 22 | 3 |
| PHENOLICS, MG/L | <0.03 | NR | NR |
| TOTAL ORGANIC CARBON, MG/L | 1.8 | 4.3 | 1.8 |
| TOTAL ORGANIC HALOGEN, UG/L | 12 | NR | NR |
| CALCIUM, MG/L | 119 | 95.6 | NR |
| COPPER, UG/L | 2.4 | 1.8 | NR |
| IRON, UG/L | 20 | 45 | NR |
| MAGNESIUM, MG/L | 20.5 | 9.53 | NR |
| MANGANESE, MG/L | 0.179 | 0.685 | NR |
| MERCURY, UG/L | <0.1 | <0.1 | NR |
| POTASSIUM, MG/L | 1.51 | 2.59 | NR |
| SODIUM, MG/L | 41.7 | 112 | NR |
| VANADIUM, UG/L | 27 | 84 | NR |
| ZINC, MG/L | 0.15 | 0.14 | NR |

NR = NOT REQUESTED

SUBMITTED BY: Craig H Caldwell

PEDCO ENVIRONMENTAL INC
LABORATORY ANALYTICAL DATA

CLIENT: USEPA OFFICE OF SOLID WASTE
401 M ST.,SW MD WH562
WASHINGTON,D.C. 20460

SAMPLE ID 08984-GM0

PEDCO NO : DL219

ATTENTION: MR WILLIAM MYERS

VOLATILES

| PP# | CAS# | | UG/L |
|---|---|---|---|
| | 107-02-8 | ACROLEIN | ND |
| | 107-13-1 | ACRYLONITRILE | 8.5 |
| (4V) | 71-43-2 | BENZENE | ND |
| (6V) | 56-23-2 | CARBON TETRACHLORIDE | ND |
| (7V) | 108-90-7 | CLOROBENZENE | ND |
| (10V) | 107-06-2 | 1,2-DICHLOROETHANE | ND |
| (11V) | 71-55-6 | 1,1,1-TRICHLOROETHANE | ND |
| (13V) | 75-34-3 | 1,1-DICHLOROETHANE | ND |
| (14V) | 79-00-5 | 1,1,2-TRICHLOROETHANE | 11 |
| (15V) | 79-34-5 | 1,1,2,2-TETRACHLOROETHANE | ND |
| (16V) | 75-00-3 | CHLOROETHANE | ND |
| (19V) | 110-75-8 | 2-CHLOROETHYLVINYLETHER | ND |
| (23V) | 67-66-3 | CHLOROFORM | ND |
| (29V) | 75-35-4 | 1,1-DICHLOROETHENE | ND |
| (30V) | 156-60-5 | TRANS-1,2-DICHLOROETHENE | ND |
| (32V) | 78-87-5 | 1,2-DICHLOROPROPANE | ND |
| (33V) | 10061-02-6 | TRANS-1,3-DICHLOROPROPENE | ND |
| | 10061-01-5 | CIS-1,3-DICHLOROPROPENE | ND |
| (34V) | 100-41-4 | ETHYLBENZENE | ND |
| (44V) | 75-09-2 | METHYLENE CHLORIDE | ND |
| (45V) | 74-87-3 | CHLOROMETHANE | ND |
| (46V) | 74-83-9 | BROMOMETHANE | ND |
| (47V) | 75-25-2 | BROMOFORM | ND |
| (48V) | 75-27-4 | BROMODICHLOROMETHANE | ND |
| (49V) | 75-69-4 | FLUOROTRICHLOROMETHANE | ND |
| (51V) | 124-48-1 | CHLORODIBROMOMETHANE | ND |
| (85V) | 127-18-4 | TETRACHLOROETHENE | 134 |
| (86V) | 108-88-3 | TOLUENE | ND |
| (87V) | 79-01-6 | TRICHLOROETHENE | 12.5 |
| (88V) | 75-01-4 | VINYL CHLORIDE | ND |
| | 67-64-1 | ACETONE | 25.3 |
| | 78-93-3 | 2-BUTANONE | 6.8 |
| | 75-15-0 | CARBON DISULFIDE | ND |
| | 519-78-6 | 2-HEXANONE | ND |
| | 108-10-1 | 4-METHYL-2-PENTANONE | ND |
| | 100-42-5 | STYRENE | ND |
| | 108-05-4 | VINYL ACETATE | ND |
| | 1330-20-7 | TOTAL XYLENES | ND |

ND=NOT DETECTED (<2 UG/L )

PEDCO ENVIRONMENTAL INC
LABORATORY ANALYTICAL DATA

CLIENT: USEPA OFFICE OF SOLID WASTE
401 M ST.,SW MD WH562
WASHINGTON,D.C. 20460

SAMPLE ID: 08984-GM1

PEDCO NO : DL220

ATTENTION: MR WILLIAM MYERS

VOLATILES

| PP# | CAS# | UG/L |
|---|---|---|
| (2V) | 107-02-8ACROLEIN | ND |
| (3V) | 107-13-1ACRYLONITRILE | ND |
| (5V) | 71-43-2BENZENE | ND |
| (6V) | 56-23-2CARBON TETRACHLORIDE | ND |
| (7V) | 108-90-7CLOROBENZENE | ND |
| (10V) | 107-06-21,2-DICHLOROETHANE | ND |
| (11V) | 71-55-61,1,1-TRICHLOROETHANE | ND |
| (13V) | 75-34-31,1-DICHLOROETHANE | ND |
| (14V) | 79-00-51,1,2-TRICHLOROETHANE | ND |
| (15V) | 79-34-51,1,2,2-TETRACHLOROETHANE | ND |
| (16V) | 75-00-3CHLOROETHANE | ND |
| (19V) | 110-75-82-CHLOROETHYLVINYLETHER | ND |
| (23V) | 67-66-3CHLOROFORM | ND |
| (29V) | 75-35-41,1-DICHLOROETHENE | ND |
| (30V) | 156-60-5TRANS-1,2-DICHLOROETHENE | ND |
| (32V) | 78-87-51,2-DICHLOROPROPANE | ND |
| (33V) | 10061-02-6TRANS-1,3-DICHLOROPROPENE | ND |
| | 10061-01-05CIS-1,3-DICHLOROPROPENE | ND |
| (V) | 100-41-4ETHYLBENZENE | ND |
| (44V) | 75-09-2METHYLENE CHLORIDE | 6.1 |
| (45V) | 74-87-3CHLOROMETHANE | ND |
| (46V) | 74-83-9BROMOMETHANE | ND |
| (47V) | 75-25-2BROMOFORM | ND |
| (48V) | 75-27-4BROMODICHLOROMETHANE | ND |
| (49V) | 75-69-4FLUOROTRICHLOROMETHANE | ND |
| | | - |
| (51V) | 124-48-1CHLORODIBROMOMETHANE | ND |
| (85V) | 127-18-4TETRACHLOROETHENE | ND |
| (86V) | 108-88-3TOLUENE | ND |
| (87V) | 79-01-6TRICHLOROETHENE | ND |
| (88V) | 75-01-4VINYL CHLORIDE | ND |
| | 67-64-1ACETONE | 29.4 |
| | 78-93-32-BUTANONE | ND |
| | 75-15-0CARBON DISULFIDE | ND |
| | 519-78-62-HEXANONE | ND |
| | 108-10-14-METHYL-2-PENTANONE | ND |
| | 100-42-5STYRENE | ND |
| | 108-05-4VINYL ACETATE | ND |
| | 1330-20-7TOTAL XYLENES | ND |

ND=NOT DETECTED (<2 UG/L )

PEDCO ENVIRONMENTAL INC
LABORATORY ANALYTICAL DATA

CLIENT: USEPA OFFICE OF SOLID WASTE
401 M ST.,SW MD WH562
WASHINGTON,D.C. 20460

SAMPLE ID: 08984-GM2

PEDCO NO : DL221

ATTENTION: MR WILLIAM MYERS

VOLATILES

| PP# | CAS# | UG/L |
|---|---|---|
| J) | 107-02-8ACROLEIN | ND |
| J) | 107-13-1ACRYLONITRILE | ND |
| (4U) | 71-43-2BENZENE | ND |
| (6U) | 56-23-2CARBON TETRACHLORIDE | ND |
| (7U) | 108-90-7CLOROBENZENE | ND |
| (10U) | 107-06-21,2-DICHLOROETHANE | ND |
| (11U) | 71-55-61,1,1-TRICHLOROETHANE | ND |
| (13U) | 75-34-31,1-DICHLOROETHANE | ND |
| (14U) | 79-00-51,1,2-TRICHLOROETHANE | ND |
| (15U) | 79-34-51,1,2,2-TETRACHLOROETHANE | ND |
| (16U) | 75-00-3CHLOROETHANE | ND |
| (19U) | 110-75-82-CHLOROETHYLVINYLETHER | ND |
| (23U) | 67-66-3CHLOROFORM | ND |
| (29U) | 75-35-41,1-DICHLOROETHENE | ND |
| (30U) | 156-60-5TRANS-1,2-DICHLOROETHENE | ND |
| (32U) | 78-87-51,2-DICHLOROPROPANE | ND |
| (U) | 10061-02-6TRANS-1,3-DICHLOROPROPENE | ND |
| | 10061-01-05CIS-1,3-DICHLOROPROPENE | ND |
| (3U) | 100-41-4ETHYLBENZENE | ND |
| (44U) | 75-09-2METHYLENE CHLORIDE | 13.9 |
| (45U) | 74-87-3CHLOROMETHANE | ND |
| (46U) | 74-83-9BROMOMETHANE | ND |
| (47U) | 75-25-2BROMOFORM | ND |
| (48U) | 75-27-4BROMODICHLOROMETHANE | ND |
| (49U) | 75-69-4FLUOROTRICHLOROMETHANE | ND |
| | | - |
| (51U) | 124-48-1CHLORODIBROMOMETHANE | ND |
| (85U) | 127-18-4TETRACHLOROETHENE | ND |
| (86U) | 108-88-3TOLUENE | ND |
| (87U) | 79-01-6TRICHLOROETHENE | ND |
| (88U) | 75-01-4VINYL CHLORIDE | ND |
| | 67-64-1ACETONE | 34.5 |
| | 78-93-32-BUTANONE | ND |
| | 75-15-0CARBON DISULFIDE | ND |
| | 519-78-62-HEXANONE | ND |
| | 108-10-14-METHYL-2-PENTANONE | ND |
| | 100-42-5STYRENE | ND |
| | 108-05-4VINYL ACETATE | ND |
| | 1330-20-7TOTAL XYLENES | ND |

ND=NOT DETECTED (<2 UG/L )

PEDCO ENVIRONMENTAL INC
LABORATORY ANALYTICAL DATA

CLIENT: USEPA OFFICE OF SOLID WASTE
401 M ST.,SW MD WH562
WASHINGTON,D.C. 20460

SAMPLE ID: 08984-GM5

PEDCO NO : DL222

ATTENTION: MR WILLIAM MYERS

VOLATILES

| PP# | CAS# | UG/L |
|---|---|---|
| (2V) | 107-02-8ACROLEIN | ND |
| V) | 107-13-1ACRYLONITRILE | ND |
| V) | 71-43-2BENZENE | ND |
| (6V) | 56-23-2CARBON TETRACHLORIDE | ND |
| (7V) | 108-90-7CLOROBENZENE | ND |
| (10V) | 107-06-21,2-DICHLOROETHANE | ND |
| (11V) | 71-55-61,1,1-TRICHLOROETHANE | ND |
| (13V) | 75-34-31,1-DICHLOROETHANE | ND |
| (14V) | 79-00-51,1,2-TRICHLOROETHANE | ND |
| (15V) | 79-34-51,1,2,2-TETRACHLOROETHANE | ND |
| (16V) | 75-00-3CHLOROETHANE | ND |
| (19V) | 110-75-82-CHLOROETHYLVINYLETHER | ND |
| (23V) | 67-66-3CHLOROFORM | ND |
| (29V) | 75-35-41,1-DICHLOROETHENE | ND |
| (30V) | 156-60-5TRANS-1,2-DICHLOROETHENE | ND |
| (32V) | 78-87-51,2-DICHLOROPROPANE | ND |
| (33V) | 10061-02-6TRANS-1,3-DICHLOROPROPENE | ND |
| | 10061-01-05CIS-1,3-DICHLOROPROPENE | ND |
| V) | 100-41-4ETHYLBENZENE | ND |
| (44V) | 75-09-2METHYLENE CHLORIDE | ND |
| (45V) | 74-87-3CHLOROMETHANE | ND |
| (46V) | 74-83-9BROMOMETHANE | ND |
| (47V) | 75-25-2BROMOFORM | ND |
| (48V) | 75-27-4BROMODICHLOROMETHANE | ND |
| (49V) | 75-69-4FLUOROTRICHLOROMETHANE | ND |
| | | - |
| (51V) | 124-48-1CHLORODIBROMOMETHANE | ND |
| (85V) | 127-18-4TETRACHLOROETHENE | ND |
| (86V) | 108-88-3TOLUENE | ND |
| (87V) | 79-01-6TRICHLOROETHENE | ND |
| (88V) | 75-01-4VINYL CHLORIDE | ND |
| | 67-64-1ACETONE | 14 |
| | 78-93-32-BUTANONE | ND |
| | 75-15-0CARBON DISULFIDE | ND |
| | 519-78-62-HEXANONE | ND |
| | 108-10-14-METHYL-2-PENTANONE | ND |
| | 100-42-5STYRENE | ND |
| | 108-05-4VINYL ACETATE | ND |
| | 1330-20-7TOTAL XYLENES | ND |

ND=NOT DETECTED (<2 UG/L )

PEDCO ENVIRONMENTAL INC
LABORATORY ANALYTICAL DATA

CLIENT: USEPA OFFICE OF SOLID WASTE
401 M ST.,SW MD WH562
WASHINGTON,D.C. 20460

SAMPLE ID: 08984-GM6

PEDCO NO : DL223

ATTENTION: MR WILLIAM MYERS

VOLATILES

| PP# | CAS# | UG/L |
|---|---|---|
| (2V) | 107-02-8ACROLEIN | ND |
| /) | 107-13-1ACRYLONITRILE | ND |
| /) | 71-43-2BENZENE | ND |
| (6V) | 56-23-2CARBON TETRACHLORIDE | ND |
| (7V) | 108-90-7CLOROBENZENE | ND |
| (10V) | 107-06-21,2-DICHLOROETHANE | ND |
| (11V) | 71-55-61,1,1-TRICHLOROETHANE | ND |
| (13V) | 75-34-31,1-DICHLOROETHANE | ND |
| (14V) | 79-00-51,1,2-TRICHLOROETHANE | ND |
| (15V) | 79-34-51,1,2,2-TETRACHLOROETHANE | ND |
| (16V) | 75-00-3CHLOROETHANE | ND |
| (19V) | 110-75-82-CHLOROETHYLVINYLETHER | ND |
| (23V) | 67-66-3CHLOROFORM | ND |
| (29V) | 75-35-41,1-DICHLOROETHENE | ND |
| (30V) | 156-60-5TRANS-1,2-DICHLOROETHENE | ND |
| (32V) | 78-87-51,2-DICHLOROPROPANE | ND |
| (33V) | 10061-02-6TRANS-1,3-DICHLOROPROPENE | ND |
| | 10061-01-05CIS-1,3-DICHLOROPROPENE | ND |
| /) | 100-41-4ETHYLBENZENE | ND |
| ...J) | 75-09-2METHYLENE CHLORIDE | 11.7 |
| (45V) | 74-87-3CHLOROMETHANE | ND |
| (46V) | 74-83-9BROMOMETHANE | ND |
| (47V) | 75-25-2BROMOFORM | ND |
| (48V) | 75-27-4BROMODICHLOROMETHANE | ND |
| (49V) | 75-69-4FLUOROTRICHLOROMETHANE | ND |
| | | - |
| (51V) | 124-48-1CHLORODIBROMOMETHANE | ND |
| (85V) | 127-18-4TETRACHLOROETHENE | ND |
| (86V) | 108-88-3TOLUENE | ND |
| (87V) | 79-01-6TRICHLOROETHENE | ND |
| (88V) | 75-01-4VINYL CHLORIDE | ND |
| | 67-64-1ACETONE | 9 |
| | 78-93-32-BUTANONE | ND |
| | 75-15-0CARBON DISULFIDE | ND |
| | 519-78-62-HEXANONE | ND |
| | 108-10-14-METHYL-2-PENTANONE | ND |
| | 100-42-5STYRENE | ND |
| | 108-05-4VINYL ACETATE | ND |
| | 1330-20-7TOTAL XYLENES | ND |

ND=NOT DETECTED ((2 UG/L )

PEDCO ENVIRONMENTAL INC
LABORATORY ANALYTICAL DATA

CLIENT: USEPA OFFICE OF SOLID WASTE
401 M ST.,SW MD WH562
WASHINGTON,D.C. 20460

SAMPLE ID: 08984-GM7

PEDCO NO : DL224

ATTENTION: MR WILLIAM MYERS

VOLATILES

| PP# | CAS# | UG/L |
|---|---|---|
| (2V) | 107-02-8ACROLEIN | ND |
| | 107-13-1ACRYLONITRILE | ND |
| (4V) | 71-43-2BENZENE | ND |
| (6V) | 56-23-2CARBON TETRACHLORIDE | ND |
| (7V) | 108-90-7CLOROBENZENE | ND |
| (10V) | 107-06-21,2-DICHLOROETHANE | ND |
| (11V) | 71-55-61,1,1-TRICHLOROETHANE | ND |
| (13V) | 75-34-31,1-DICHLOROETHANE | ND |
| (14V) | 79-00-51,1,2-TRICHLOROETHANE | ND |
| (15V) | 79-34-51,1,2,2-TETRACHLOROETHANE | ND |
| (16V) | 75-00-3CHLOROETHANE | ND |
| (19V) | 110-75-82-CHLOROETHYLVINYLETHER | ND |
| (23V) | 67-66-3CHLOROFORM | ND |
| (29V) | 75-35-41,1-DICHLOROETHENE | ND |
| (30V) | 156-60-5TRANS-1,2-DICHLOROETHENE | ND |
| (32V) | 78-87-51,2-DICHLOROPROPANE | ND |
| (33V) | 10061-02-6TRANS-1,3-DICHLOROPROPENE | ND |
| | 10061-01-05CIS-1,3-DICHLOROPROPENE | ND |
| | 100-41-4ETHYLBENZENE | ND |
| (44V) | 75-09-2METHYLENE CHLORIDE | 10.4 |
| (45V) | 74-87-3CHLOROMETHANE | ND |
| (46V) | 74-83-9BROMOMETHANE | ND |
| (47V) | 75-25-2BROMOFORM | ND |
| (48V) | 75-27-4BROMODICHLOROMETHANE | ND |
| (49V) | 75-69-4FLUOROTRICHLOROMETHANE | ND |
| | | - |
| (51V) | 124-48-1CHLORODIBROMOMETHANE | ND |
| (85V) | 127-18-4TETRACHLOROETHENE | ND |
| (86V) | 108-88-3TOLUENE | ND |
| (87V) | 79-01-6TRICHLOROETHENE | ND |
| (88V) | 75-01-4VINYL CHLORIDE | ND |
| | 67-64-1ACETONE | 6.8 |
| | 78-93-32-BUTANONE | ND |
| | 75-15-0CARBON DISULFIDE | ND |
| | 519-78-62-HEXANONE | ND |
| | 108-10-14-METHYL-2-PENTANONE | ND |
| | 100-42-5STYRENE | ND |
| | 108-05-4VINYL ACETATE | ND |
| | 1330-20-7TOTAL XYLENES | ND |

ND=NOT DETECTED ((2 UG/L )